THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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Plant Industry Station
Beltsville, Maryland

LETTER TO RECIPIENTS OF THE PLANT DISEASE REPORTER

Each of you, with the exception of our official Plant Disease Survey Collaborators and foreign subscribers, will shortly have an inquiry from the Division of Information as to whether or not you wish to continue to receive the Plant Disease Reporter and its Supplements. This is being done in accordance with an existing Federal regulation and I am calling it to your attention to suggest that you be on the lookout for this duplex card, and if you want the Reporter make prompt reply, thus insuring uninterrupted service.

I should like to take this occasion to extend again an invitation to all of you in a position to make observations on the current disease situation to submit pertinent findings for publication in the Reporter.

We in the Survey are very appreciative of your cooperation.

Cordially yours,

Paul R. Miller

Paul R. Miller
Pathologist in Charge
Plant Disease Survey

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DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station Beltsville, Maryland
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IN THIS ISSUE

In Arkansas, the wet fall of 1945 had much to do with reduced acreage and yields of oats; anthracnose, Helminthosporium blight and leaf spot were abundant in the spring and growing season, according to H. R. Rosen, page 364.

R. S. Kirby reports observations on stem rust in Pennsylvania in 1946, page 369.

Frost injury to wheat heads occurred in Western Kansas and Central Nebraska, according to Harold L. Stout and Aaron G. Johnson, page 370.

John A. Stevenson and Aaron G. Johnson discuss the nomenclature of the barley leaf rust, page 372.

Some diseases of cantaloups and honey dew melons observed in southern California are reported by John T. Middleton and Thomas W. Whitaker, page 373.

Paul G. Smith sends in reports on witches'-broom of cucumber and cantaloup in the South Pacific, page 375, and some vegetable diseases in the South Pacific, page 376.

A. H. Eddins reports losses caused by potato diseases in the Hastings Section, Florida during the 15-year period 1932-1946, page 379.

Endothia canker on post oak is reported by Russell B. Clapper et al., page 381.

S. B. Fenne summarizes the results of tobacco blue mold control demonstrations in Virginia, 1946, page 382.

Miscellaneous notes on plant diseases in Arkansas are sent in by V. H. Young, page 385.

Check list revision (Alyssum to Erysinum), by Freeman Weiss, page 388.

Corrections, page 404.

August weather and weather of the summer of 1946, page 405.

OAT DISEASES IN ARKANSAS, 1946

H. R. Rosen

Owing to an excessively wet fall which prevailed over most of Arkansas in 1945, the acreage of winter oats was considerably lower than that of the last two years. Many growers were unable either to prepare a seed bed or to plant. In many fields which were planted, the stands when observed in May 1946, in the course of a 1700-mile survey of oat diseases covering all the important oat growing counties in the State, were irregular and sparse, especially in low parts.

Directly and indirectly this wet fall had probably more to do with reduced acreage and reduced yields than any other factor. Indirectly, it seemingly favored three parasitic diseases which appeared in exceptional abundance in the fall and which following a mild winter, appeared in abundance in the spring and throughout the growing season.

These three parasitic diseases were anthracnose, Helminthosporium blight, and Helminthosporium leaf spot.

Anthracnose. Not since 1938 (PDR 22(14): 288) has so much anthracnose been noted, although the disease was quite prevalent here during 1945, another season of high rainfall during the growth of oats. At the University farm, Fayetteville, it was first noted in late October, 1945, on varietal test plots which has been sown September 19. The first symptoms noted consisted of stunted growth with few tillers and small leaves, these being confusingly like those on plants which were located in the lowermost parts of the fields where drainage was poor and where the plants were apparently suffering from excessive soil moisture. It was very difficult to differeniate the two diseases since they frequently were found in the same spot of ground and it may be that in these cases anthracnose served as a weak parasite attacking plants that had already been injured by excessive soil moisture. However, anthracnose symptoms were also common on plants that grew on higher ground where no injury from water-logging was evident.

Following the stunted growth, the leaves turned reddish and by the middle of November, became brown and dead. When tillers and whole plants with such symptoms were examined under a lowpowered binocular the sclerotoid bodies, characteristic of anthracnose on oats (Sanford, G. B., Scientific Agriculture 15: 370-376, 1935), were found studding parts of the rhizoid or leaf sheaths or both. Plants completely killed prior to cold weather were relatively rare but dead leaves and whole tillers apparently killed by anthracnose were by the end of November found in considerable abundance on 42 varieties and selections. The amount of disease varied somewhat with the variety and with replicates of the same variety. Nearly every plant examined had some dead basal

leaves showing the characteristic sclerotoids prior to the advent of winter weather. If there were any plants wholly free from infections, they were overlooked.

Fully developed acervuli with setae and spores were rather difficult to find at first but by early December most leaves bearing black sclerotoids showed acervuli, setae, and spores characteristic of Colletotrichum graminicolum.

Localized blade lesions were comparatively rare in these fall infections although a few were noted in the form of relatively large brown spots and streaks with sclerotoids and occasionally acervuli in the brownish dead areas.

Following a mild winter season with very little winter killing, February, March, and April were exceptionally warm and otherwise seemingly highly favorable for anthracnose despite below normal precipitation in March at the University farm. While some anthracnose appeared early on spring oats planted in March, the amount was not as great as on winter oats and for the first time in about 25 years, the highest yielding oats were among the spring-sown varieties.

On winter oats, severely infected tillers often failed to send up flowering stalks while those that did, eventually produced panicles that filled poorly or not at all, resulting in premature ripening. Unlike fall infections, spring infections, commonly took the form of localized blade, sheath, rachis, and glume infections, although seedling infections which resulted in premature ripening and early death of whole plants were not rare.

As a whole anthracnose appeared to have affected quality more than quantity so that in winter oats, weight per bushel in heavily infected varieties was considerable below average although bushels per acre suffered relatively slight reduction. Varieties which yielded at the rate of 60 or more bushels per acre and which often in the past gave weights of 34 to 38 pounds per bushel were reduced to 29 to 33 pounds. This was noted in varieties and selections of Bond hybrids which are resistant to Helminthosporium blight and which, while infected in varying degrees with Helminthosporium leaf spot fungus appeared to have suffered little from other diseases. On the other hand, among Victoria hybrids such as Stanton, Letoria, DeSoto and Traveler, it was difficult to determine how much reduction was caused by anthracnose because of the prevalence of Helminthosporium blight and leaf spot.

While percentages of anthracnose infections were estimated for all varieties and selections of winter oats grown at the University farm, it is quite doubtful if the figures are of any great significance. With the number of varieties involved and the time available it was

not found possible to remove and examine the bases and root systems of an adequate number of samples so that the figures at best mostly represent amount of infections noted on the upper leaves of the plants. The following are some of the figures in terms of percentage of infected leaf areas: Lee, 35%; Letoria, 12.5%; Stanton 4, 25%; DeSoto, 20%; Traveler, 10%; Marmac, 25%; Fulghum 708, 25%; Fulghum 2500, 10%; and Victorgarin 6, 25%. These estimates were made on May 21 and 24 when most of the varieties were in the milk stage.

Helminthosporium blight. This marks the third consecutive year in which a disease has been noted in Arkansas which is mostly confined to Victoria hybrids and which differs considerably in symptoms from the well known leaf spot (leaf blotch) caused by Helminthosporium avenae (Amer. Jour. Bot. 33: 223, 1946. Abs.). It appears to be similar to the disease described by Meehan and Murphy (Phytopath. 36: 406, 407, 1946. Abs.) although there are differences seemingly in spore measurements, in varietal susceptibility, and somewhat in symptoms.

While Murphy's Helminthosporium diseases of oats is confined to varieties possessing the Victoria type of crown rust resistance (loc. cit. p. 407), the writer's isolates from diseased tissues of various Victoria hybrids produced infections on Markton, and Winter Turf 435-4 as well as on all Victoria hybrids investigated (some 30 varieties and selections).

Bond and some of its hybrids while not immune, are highly resistant. When a spore suspension is sprayed on seedlings of Bond, Clinton, and other Bond hybrids and left overnight in a cloth enclosed chamber on a greenhouse bench, the house kept at approximately 20° C., minute darkbrown or blackish spots appear on the blades within 4 or 5 days after inoculation in contrast with susceptible varieties which within 24 to 48 hours after inoculation show many collapsed, sunken spots on the blades, varying in size from one to several mm, irregular in outline, and grayish green in color. These grayish green spots, as they age and dry out often become light brown or tan colored surrounded by reddish or yellowish halos, much of the blade dying by the fifth or sixth day when the spots are numerous. On Bond and its hybrids the symptoms are much less severe and approach those of the common leaf spot caused by H. avenae. In addition to severe blighting of blades, many Victoria hybrids when inoculated in the seedling stage show infected coleoptiles, the infections often reaching the coronal tissues and eventually resulting in the death of the whole seedling. No such infections were obtained on Bond and its hybrids.

In addition to Bond and its hybrids the following varieties showed resistance in the greenhouse when artificially inoculated or in the field under natural conditions for infection: Lee, Custis, Hairy

Culberson, Wintok. Fulghum derivatives including Fulghum 708, Fulghum 2498, Fulghum 2499, Tennex, Forkedeer, Fulwin, Fulghum 2500, and Fulghum 3232, all Red Rustproofs including Ferguson 922, Nortex, New Nortex, and Red Rustproof 1815, Coker 32-1, Marion, and Mutica Ukraina.

Among the named Victoria hybrids which were found to be highly susceptible were Marmac, Traveler, DeSoto, Stanton Str. 1 and Str. 4, Letoria, Fultex, Fulgrain Str. 6 and Str. 8, Victorgrain Str. 4, Neosho, Osage, Boone, Tama, and Vicland. Victoria itself was found to be very susceptible.

No infections were obtained in artificial inoculations of wheat seedlings (Sanford and Alabama Bluestem). Small, dark brown spots, slightly resembling net blotch were obtained on the two varieties, Fayette and Texan, of barley artificially inoculated.

In addition to the symptoms described above on susceptible oat varieties, infected seeds (artificially as well as naturally infected) give rise to seedlings blighted and killed after emergence as well as a fairly sizeable percentage killed prior to emergence. On older plants, including those that are heading, blade and sheath blighting are readily produced by artificial inoculations with spore suspensions applied as sprays. Blight of leaf sheaths in older plants is usually more destructive than blade blighting, particularly when it involves the lower sheaths. When this occurs, the fungus often reaches the basal tissues, causing a brownish rotting of these areas, which frequently results either in the death of the whole tiller prior to heading or in its premature death after heading.

Under field conditions (natural infections) in 1946, there was much blade blighting on susceptible varieties, often resembling halo blight, some tiller blighting, and as much as 20 percent reduction in seedling stand even in fields sown with seed treated with New Improved Ceresan. In the fall of 1945, Traveler, Victorgrain, and Fulgrain, seemed particularly susceptible to seedling blight of the pre-emergence type. However, in spite of these reductions in stand and other ill effects, yields of 60 to 70 bushels per acre were fairly common in Traveler and other Victoria derivatives. Only in the nursery were the yields of these deratives seemingly much lowered by this disease and this only in early fall plantings. Late fall plantings, appeared to be free from seedling and tiller blights and while developing leaf spotting rather late in the spring, produced much better yields than the earlier plantings. This also happened in 1944-45 and apparently represents the reverse of the usual sequence, obtained with resistant varieties, which under Arkansas conditions gave in years past the best grain yields from the earlier fall plantings with varieties like Lee and Ferguson 922.

The difference in amount of Helminthosporium blight and in grain

yields of Victoria derivatives planted early vs. late in the fall is probably associated mainly with differences in soil and our temperatures, the warmer early fall being more conducive to disease development than the cooler, late fall. This seemingly is true not only for Helminthosporium blight but also for anthracnose, crown rust, Helminthosporium leaf spot, and halo blight.

Helminthosporium leaf spot (leaf blotch). This disease was about as prevalent in 1946 as in 1945, both years being characterized by relatively high percentages of infection, roughly 25 percent of the leaf areas for the State as a whole. Lower leaves usually showed more infections than upper ones but it is not clear that this difference is due to differences in weather conditions or to differences in susceptibility. Given any one plant, no leaf showed immunity, including flag leaves. While there appeared to be differences in susceptibility between varieties, no variety showed a high degree of resistance. Usually Red Rustproof showed fewer infections but even in these there were occasional fields noted, particularly in the south east corner of the State where infections were estimated at 30 percent of the leaf area.

Crown Rust. Taking the State as a whole, crown rust [Puccinia coronata] of oats was not important either on fall planted or spring planted oats in 1946. However, in more or less localized areas, as at Hope, Hempstead County, and Marianna, Lee County, fully 90 percent of the leaf areas of susceptible varieties were infected when the plants were in the early milk stage.

Oat smuts. Less smut [Ustilago spp.] was found on oats in 1946 than at any time in the last decade. This may be partly due to the substitution of smut resistant varieties such as Traveler, DeSoto, and Stanton for the older smut susceptible types such as Lee, Winter Turf and Fulghums. The new race of loose smut recently described from Kansas (Phytopath. 36: 433-445, 1946) which produces a high percentage of infection on Traveler, Fultex, Stanton Str. 2 and Victorgrain Str. 5, was either not present or present in such small quantities as to be overlooked.

Sterility. In 1946 it was difficult to find a panicle of fall or spring planted oats which did not have a number of blasted or underdeveloped spikelets. Whatever the causal agent or agents may be, this disease was present throughout the State and seemingly was more prevalent in late maturing varieties such as Winter Turf among winter oats and Marion among spring varieties. A rough estimate of the percentage of sterility for the State as a whole is 5 to 10 percent of the spikelets.

AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARKANSAS

OBSERVATIONS ON STEM RUST IN PENNSYLVANIA IN 1946

R. S. Kirby

In order to have information on the barberry stem rust situation, a check was made on barberry bushes in 6 areas where it had been impossible to keep regrowth eradicated. Three locations were selected where grain was planted near barberry in 1945 and 1946, namely, Huntingdon, Lebanon, and York Counties, and 3 locations where grain was not grown near the bushes in 1945. Barberry infection was watched at each location and a check maintained to determine the amount of stem rust developing on young wheat and other small grains. Two stem rust spreads started early on young wheat, one in York County and one in Huntingdon County.

At the 3 observation places where grain was not grown near the bushes in 1945, little or no stem rust was found on small grain. In Lebanon County the infected barberry bushes were dug up by the owner before aecia discharged spores and nearby wheat fields remained free of rust until harvest.

In Huntingdon County one barberry bush growing across the road from wheat in 1945 had light rust infection this spring. The rust spread from this barberry to a nearby wheat field and caused serious damage. It was estimated that the wheat near the barberry suffered a 60 percent loss.

At Davidsburg, York-County, numerous barberry bushes were growing in a mile square area, much of which had wheat in 1945 and 1946. Most of the bushes had heavy rust infection (pycnia found April 11). Favorable wet weather enabled the stem rust to spread to nearby young wheat at an early stage.

By June 18 stem rust had killed wheat plants growing nearest the barberry and the telial stage of stem rust was present only near the bushes. On this date wheat was in the flower stage. A prolonged Northeaster at the end of May, with several days rain and strong winds, enabled stem rust to multiply and spread for 40 miles east and west and 20 miles north and south of the bushes. Extension pathologists, working with barberry eradication personnel, visited over 120 wheat growers to determine the extent and severity of this rust spread. The accompanying map shows the location of known barberry and the amount of stem rust found in wheat fields in the area around York County (Figure 1, page 371).

Of the 4 wheat producing counties near Davidsburg it has been possible to eradicate barberry regrowth in all areas with the exception of Davidsburg.

Because of a manpower shortage preventing barberry eradication in a small area, stem rust started from that area and reduced wheat yields from 20 to 60 percent in 800 square miles of York and Adams Counties closest to the barberry. Reports of wheat yields received to date from the rust spread area, indicate that the estimated losses may even have been a little low and that a total of 200,000 bushels of wheat may have been destroyed by stem rust in this spread.

This rust spread shows that stem rust may spread from barberry for 20 miles or more across an area like Adams County where barberry bushes had been removed.

PENNSYLVANIA STATE COLLEGE
August 13, 1946

FROST INJURY TO WHEAT HEADS

Harold L. Stout and Aaron G. Johnson [1]

During May, frost injury to wheat heads occurred over a considerable area in Western Kansas and to some extent in Central Nebraska. At the Garden City Branch Station, Garden City, Kansas, on the morning of May 11, 1946, the temperature went down to 27° F and remained at that level for about two hours. At that time, the Comanche wheat on the rotation plots was in head and an average of about 70 percent of the florets in the heads were killed. The florets that were just in bloom seemed to be the most susceptible. The injury ranged from total killing on some heads (Fig. 1, left) to various degrees of killing in others (Fig. 1, center and right). In many heads, the florets that had passed the blooming stage, particularly those in the middle part of the head, were not killed and subsequently developed normal kernels (Fig. 1, center and right). In some heads, only the florets at the tip or base or both developed kernels. Such florets no doubt were in the pre-blooming stage at the time of the freeze and, therefore, apparently were more resistant to the freezing injury than those in the middle, more advanced portion of the heads. In many florets, kernels that were one-half to two-thirds developed were killed. In the mature heads at harvest time, such kernels, were extremely shrunken, practically without starch, feather light, and non-viable. Some of these shrunken kernels were as much as two-thirds the length but only about one-third the diameter of the normal kernels.

Legend to Figure 1. ☒ = Mile square area of barberry bushes.
8 = Each numeral represents a wheat field examined and shows the percentage of infection.
+ = Represents a wheat field examined, having less than one percent of stem rust.
0 = Represents a wheat field examined having no stem rust.

[1] Divisions of Soils, Fertilizers, and Irrigation; and Cereal Crops and Diseases, respectively, Bureau of Plant Industry, Soils, and Agricultural Engineering in cooperation with Kansas Agricultural Experiment Station.

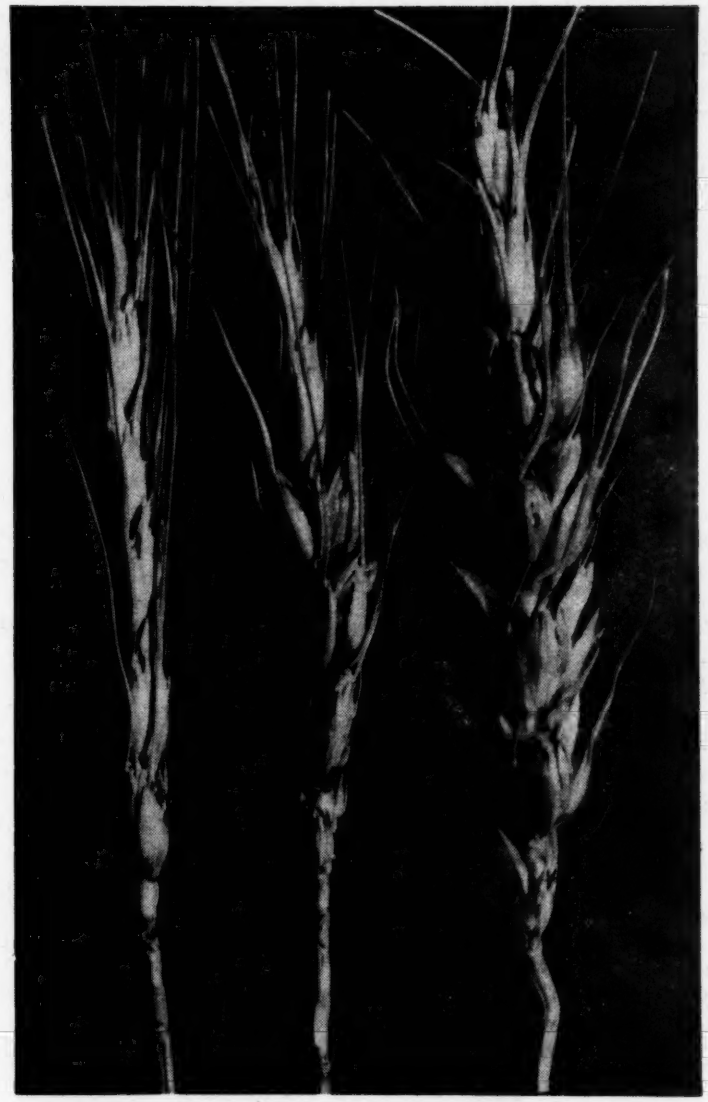
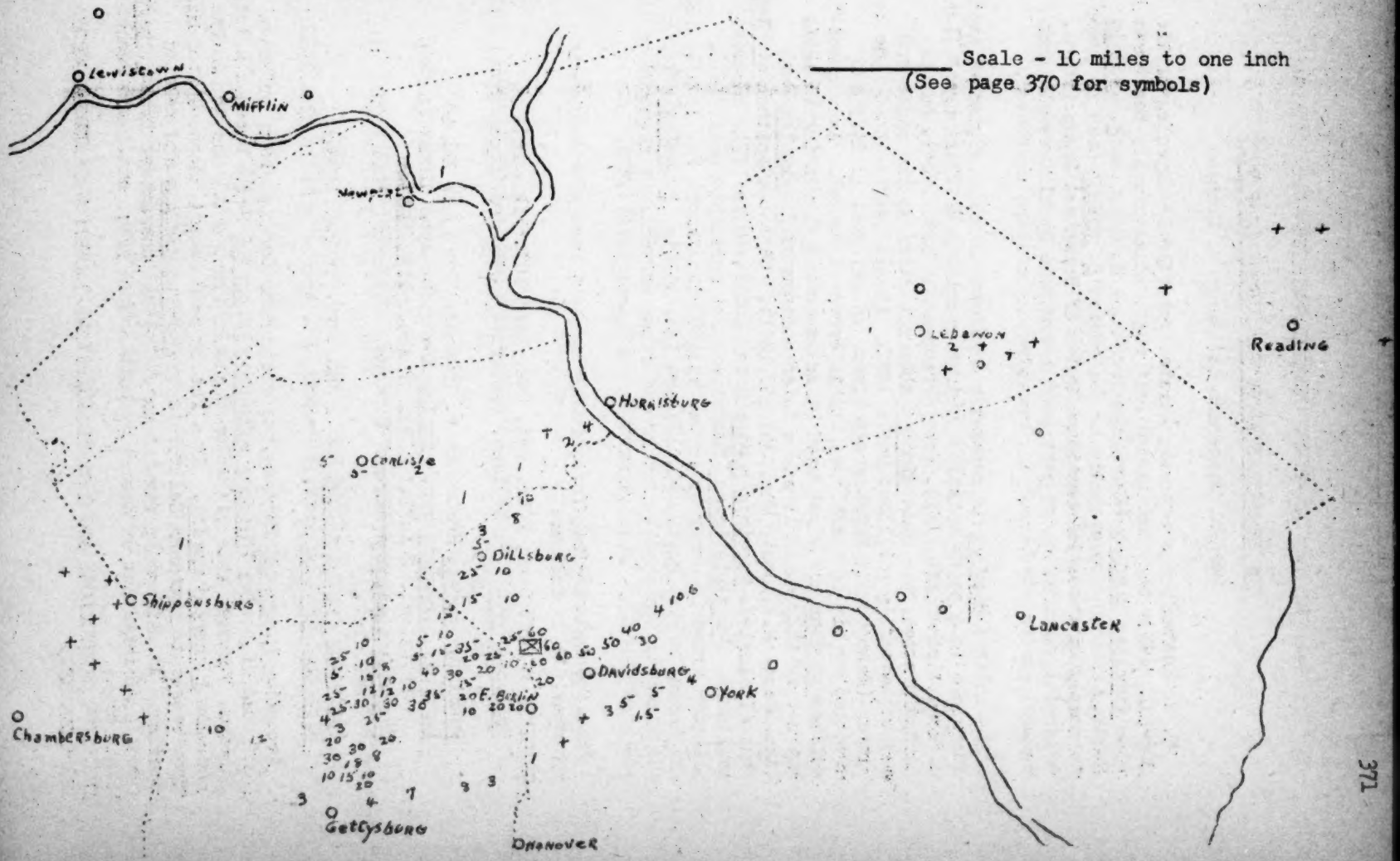


Fig. 1--Mature heads of Comanche wheat showing the effects of frost injury at flowering time at Garden City, Kansas, May 11, 1946. (Left, all florets killed; center and right tip and basal florets killed). x2.

Fig. 1. Relation of stem rust in wheat fields to barberry bushes at Davidsburg, York County June 18, 19, 21, 24, and 25, 1946



THE NOMENCLATURE OF THE BARLEY LEAF RUST

John A. Stevenson and Aaron G. Johnson

N. F. Buchwald has recently pointed out (Annales Mycologici 41: 306-316. 1943) that the barley leaf rust, which usually has borne the name Puccinia simplex (Koernicke) Eriks. & E. Henn. or P. anomala Rostr., should more properly be designated P. hordei Otth in order to comply with the International Rules of Botanical Nomenclature. A careful examination of pertinent literature by him reveals that several errors have crept in, creating the present confusion.

The epithet simplex is generally supposed to have originated with Koernicke in a paper entitled "Naturhistorische Mittheilungen" (Land u. Forstwirtschaftl. Zeit. Prov. Preussen 1: 323. 1865), but as Buchwald notes, the name simplex does not occur in the paper and was not actually published until 1882. It was used at that time by Winter (Rabenhorst, Kryptogamen Flora, ed. 2, vol. 1: 218) and credited by him to Koernicke, but in error of course. As a specific epithet simplex was first used by Eriksson and E. Henning in 1894, but not validly since it was a later homonym of P. simplex Peck (Ann. Rept. N.Y. State Mus. 34: 45. 1881). With the epithet simplex thus eliminated, Puccinia hordei Otth, published in 1871, becomes available. Puccinia hordei Fuckel was not published until 1873, although cited in error by Arthur as 1860 (No. Amer. Fl. 7: 339. 1920 and Manual of the Rusts, pp. 176 and 185. 1934). P. anomala Rostr., the binomial accepted by Arthur and other workers, is rejected on the basis of priority, not having been published until 1878.

The accepted binomial for this barley leaf rust with pertinent synonymy, is as follows:

PUCCINIA HORDEI Otth, Mitt. Nat. Ges. Bern 1870: 114. 1871.
Uromyces hordei P. Nielsen, Ugeskrift Landmaend (Copenhagen) 1875, 1: 567. 1875.
Puccinia anomala Rostr. in v. Thuemen, Flora 61: 92. 1878.
Puccinia straminis var. simplex Koernicke apus Winter in Rab. Krypt.-Fl. 2 Aufl., 1 Bd., 1 Abt.: 218. 1882.
Puccinia simplex Erikss. & E. Henn., Zeitschr. Pflanzenkr. 4: 260. 1894.
(Aecidium ornithogaleum Bub., Ann. Myc. 3: 223. 1905).
Dicaeoma anomalum Arth. & Fromme, No. Amer. Flora 7: 339. 1920.

Accepting P. hordei Otth as the valid name for the dwarf or brown leaf rust of barley (Hordeum vulgare), P. hordei Fckl. becomes a later homonym. To meet this situation Buchwald (loc. cit.) has set up the new name P. hordei-murini. This latter rust occurs in the United States from Oregon to southern California on Hordeum murinum and related species. It differs in several morphological characters from P. hordei Otth, as pointed out in detail by both Arthur (loc. cit.) and Buchwald (loc. cit.)

DIVISION OF MYCOLOGY AND DISEASE SURVEY AND DIVISION OF CEREAL CROPS AND DISEASES.

SOME DISEASES OF CANTALOUPS AND HONEY DEW MELONS OBSERVED IN SOUTHERN CALIFORNIA

John T. Middleton and Thomas W. Whitaker

Mosaic: Mosaic, caused by the cantaloup mosaic virus, was perhaps more prevalent this year in cantaloups and honey dews than in any other year in the history of melon production in the Imperial Valley of California. The virus causes a conspicuous mosaic pattern in the leaves, with only slight rolling and disfiguration, and usually reduces the size of the leaf without material alteration of its perimeter; petioles and stems may be slightly mottled. Immature fruits are conspicuously mottled, with more or less circular, raised, dark green areas upon a light green background; fruits are frequently distorted into odd shapes. The net on ripening infected cantaloup fruits fails to develop properly in aerial extent and depth, and as a consequence the sutures appear broad and shallow; this results in the production of a large number of "slickers" and sunburned fruit. Normal appearing cantaloups from mosaic-infected vines are lower in total soluble solids than normal appearing fruit from healthy vines. Mature infected honey dew fruits remain mottled, the pattern is one of light green, on a yellow-green background, and the fruit surface retains some of its earlier roughness.

There is a meterial reduction in yield of both cantaloups and honey dew melons as a result of virus infection. The yield is reduced through the failure of infected vines to set a normal amount of fruit as well as by the production of fruit of poor quality. Diseased cantaloups usually outyield diseased honey dews, cantaloups producing about a 70 percent crop and honey dews about a 25 percent crop.

Mosaic-infected young vines evidence a severe shock effect followed by a fair recovery, whereas mosaic-infected old vines show no such shock effect but fail to recover sufficiently to yield even a much reduced crop.

Seed samples of planting stock used for this season's commercial plantings were obtained from several sources and tests were made to determine the extent of seed transmission of the virus. Four lots of honey dew seed tested showed 2.1, 2.2, 5.5, and 6.2 percent transmission of the virus. Three lots of Powdery Mildew Resistant Cantaloup No. 5 seed gave 1.8, 2.6, and 4.7 percent seed transmission. Cantaloup seed taken from fruits borne on severely infected vines proved to carry cantaloup mosaic virus to the extent of 18.5 percent.

The presence of the virus in the seed planted, unusually large aphid populations observed early in the growing season, and inadequate supplies of insecticides, may well account for the severity of

the disease this year.

An acreage survey revealed that of 8023 (6503 cantaloups, 1520 honey dews) acres observed, all were infected to some degree, varying from 5 percent to 100 percent in cantaloups, and from 35 percent to 100 percent in honey dews.

A careful survey of a large number of commercial varieties, several hundred inbred lines, and segregating material in the breeding plot collections of the U.S. Department of Agriculture, failed to show any indication of resistance to this virus disease.

Leafspot: Leafspot of cantaloup, caused by Alternaria cf. cucumerina (? Alternaria tenuis), has recently become of some economic importance in several areas in southern California. Although the disease has been observed in some of the coastal melon growing portions of southern California for a number of years, its occurrence has not been recognized in the agricultural areas of the Colorado Desert. Leaf spot apparently became fairly widespread at about the time several of the new powdery mildew resistant cantaloup varieties were released. Small, circular spots, 1 to 2 mm in diameter, and translucent and watersoaked first appear in the crown leaves; these spots later turn yellow and become brown and necrotic. Defoliation of the crown leaves exposes the first fruit set, resulting in yield reduction through sunburn damage. Infected vines are apparently of low vitality and predisposed to considerable heat and wind damage.

The occurrence of leafspot about the crown of the plant suggests the possibility of seed transmission of the disease.

Several cantaloup varieties and a number of inbred lines exhibited marked resistance, or possibly immunity, to leafspot, and it is hoped that genes for resistance can be incorporated into powdery mildew resistant varieties by appropriate crosses and backcrosses, combined with selection.

Root rot: Root rot, caused by Pythium aphanidermatum, has been observed in several plantings of cantaloup and honey dew melons in the Imperial Valley. Infected plants are usually stunted, somewhat chlorotic, badly wilted, and frequently die. Infected vines yield but few melons and they are of inferior quality. The disease occurs in localized areas, usually in poorly drained soils or in soils which may be adequately drained but which are subject to flooding due to the slope of the land and irrigation practice. Root rot is most active during hot weather when soil temperatures are moderately high and conducive to the optimum growth of the fungus. The small, fibrous roots of infected plants are discolored and flaccid, the cortex readily separating from the stele. The large, fleshy roots are frequently infected, resulting in localized, watersoaked, pink or dull

red, necrotic lesions.

Pythium aphanidermatum, isolated from diseased cantaloup roots, has been proved pathogenic to cantaloup roots upon inoculation.

DIVISION OF PLANT PATHOLOGY, UNIVERSITY OF CALIFORNIA, RIVERSIDE, AND DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE

WITCHES'-BROOM OF CUCUMBER AND CANTALOUP IN THE SOUTH PACIFIC

Paul G. Smith

During the latter part of the war the writer was employed by the Foreign Economic Administration in connection with its program of large scale vegetable production for the Armed Forces on some of the islands of the South and Central Pacific. While on the island of Espiritu Santo in the New Hebrides, an interesting disease, probably caused by a virus, appeared on cantaloups (Cucmis melo) and on cucumbers (Cucumis sativus). This was new to the writer and so far as is known, never previously described. Conditions did not permit experimentation, so nothing was done beyond noting the following symptoms on cucumber plants. Symptoms on cantaloup were essentially the same.

General Appearance of Plant

Infected plant or portion of plant was much reduced in size and appeared as a mass of small leaves due to excess proliferation of leaves and reduction of all individual organs. Early infection resulted in the whole plant taking on a "witches'-broom" appearance. Later infection affected only new growth. Infected plants remained alive until destroyed by cultural operations.

Symptoms

Stems. Smaller in diameter, slender and spindly. Internodes somewhat shortened, and nodes in contact with moist soil readily produced adventitious roots. Branching occurred at every node of primary stems. At every node on both primary and secondary stems were produced from 3 to 6 flower buds. Normally only 1 flower blossomed at a time. The result of this extreme branching, with leaves and flowers at every node, produced the characteristic dense growth or "witches'-broom" appearance.

Flowers. Pencuncles 1 to 1 1/2 inches long, very slender and weak. Petals of open flowers approximately half normal size, normal to

greenish yellow in color. Nearly all flowers are male, the proportion of male to female was far in excess of normal. Male flowers had definitely enlarged sepals, either narrow and strap-like up to 1/2 inch long or more frequently in the form of small leaflets with a definite petiole-like structure and lanceolate to pointed ovate blade up to 1/2 by 3/8 of an inch in size. Female flowers occasional, sepals proportionate to flower size. Ovary at time of blossoming about 3/8 of an inch long, less than normal diameter and with spines much reduced. Ovaries sometimes grew to 1 to 1 1/2 inches before turning yellow and dropping. Fruit never set on infected plants and, on portions of plant with fruit developing before infection, the fruit turned yellow and dropped.

Leaves. Leaves reduced in size but retained characteristic shape. Petiole seldom more than 2 inches long. Blade not more than 2 1/2 inches long by 1 1/2 inches wide and usually smaller. Color only slightly lighter than normal. Mosaic type mottle never observed.

Hosts. Similar symptoms were observed on cantaloup and cucumber and on an unidentified wild cucurbit which may have acted as source. Other cultivated cucurbits were not available for observation at time of disease prevalence.

Vector. Unknown.

Time of Appearance. Observed during months of December, January and February (summer) only, although cucumbers were growing at all times of the year.

DIVISION OF TRUCK CROPS
UNIVERSITY OF CALIFORNIA
DAVIS, CALIFORNIA

SOME VEGETABLE DISEASES IN THE SOUTH PACIFIC

Paul G. Smith

While employed by the Foreign Economic Administration in 1944-45 to assist with vegetable production for the Armed Forces in the South Pacific the writer had an opportunity to make some observations on vegetable diseases which occurred. Inadequate laboratory facilities on the islands prevented attempts to culture the organisms; and specimens of diseased plant material shipped to the University of California, Division of Plant Pathology, failed to yield viable fungi. Identifications are, therefore, tentative and based on observations alone. Despite this possibility of inaccuracy, it is believed worth while to record the following diseases observed. These cover farming

operations on Guadalcanal and Bougainville in the Solomon Islands and Espiritu Santo and Efate in the New Hebrides.

Root knot nematode was observed on tomatoes and watermelons on Espiritu Santo and Bougainville. On Espiritu Santo infestation was light and was seen on land which had been cleared of its jungle cover and probably planted to a crop of cotton prior to the planting of tomatoes. On Bougainville, however, it appeared as a heavy infestation on tomatoes and watermelons which had been planted on ground freshly cleared of jungle. On this island it was observed in three widely separated places which were planted for the first time. That the land may have been planted with native gardens in times past is quite possible for the practice of the natives is to clear a new location each year for their gardens, consisting largely of sweet potatoes, taro, and sugar cane. Regardless, it had been present for many years in areas uninhabited by white people. Observations were not made on Efate, and on Guadalcanal the areas farmed were on heavy soil which had previously been in almost pure stands of coarse grass which probably did not favor the organism.

On tomatoes, Alternaria early blight and Cladosporium leaf mold were present on all four islands on plantings on F.E.A. operated farms and frequently were extremely serious. In view of the fact that tomatoes planted by military personnel from non-F.E.A. seed sources and in isolated areas were frequently free of either disease at the same time they were prevalent on the regular farm plantings strongly suggests they were introduced as seed-borne parasites. What is believed to be anthracnose was observed on fruit in Espiritu Santo. Tobacco mosaic, quite naturally, was common and an occasional plant showed symptoms of "big bud".

On pepper spots of anthracnose occurred on the fruit. These were seldom observed until the fruit approached maturity. A mushy soft rot of fruit in all stages of maturity often occurred following puncture of the fruit by an unidentified insect. This was observed at Espiritu Santo. Tobacco mosaic was common.

Eggplant was attacked by Phomopsis but the degree of damage was seldom serious in spite of the extremely heavy rainfall that occurred at some seasons. This was observed on Guadalcanal and Bougainville, and probably was seed-borne. A disorder resembling "big bud" was seen on one or two plants at Guadalcanal. On Espiritu Santo a root rot attacked eggplant and pepper but did not affect okra growing adjacent. This caused a cortical decay and brown vascular discoloration which extended only 2 or 3 inches above the ground line. The striking characteristic, however, was a dense mat of white mycelial strands at the ground radiating away from the infected stem for an inch or more. These strands were also evident on the below ground portions of the infected stem and root.

Corn was attacked by a fungous leaf blight which was present on all crops but never caused more than slight damage. Symptoms appeared to be similar to those for Helminthosporium. This was observed on Espiritu Santo only, although it probably occurred on the other islands, but was not observed. Smut was never seen.

Snap beans were infected somewhat by mosaic, as expected, and on the island of Efate bean rust was present. This was not observed elsewhere, however, but so few beans were grown on the other islands that observations were very limited. It must be pointed out, however, that Efate is the only island in either the New Hebrides or Solomons which has a white settlement large enough to be dignified as a town and a white population equal or exceeding that of all other islands of these two groups put together. The possibility of introduction cannot be overlooked.

On the cucurbits, downy mildew [Pseudoperonospora cubensis] was present on all four islands and usually quite troublesome on cucumbers. The fact that it always appeared promptly even on initial plantings on new land and on every subsequent planting, and was also observed on unidentified native wild cucurbits is almost conclusive evidence that the disease is indigenous to these islands. There was no observable difference between the spores and sporangia from the cultivated and wild host when viewed under the microscope. Cantaloup and watermelon were little affected.

Powdery mildew [Erysiphe cichoracearum] was observed on cucumbers and cantaloups on Espiritu Santo only. This was not seen on wild cucurbits, but pumpkin (Cucurbita pepo) growing wild on Espiritu Santo may have served as the maintaining host. It is noteworthy that this disease appeared on the cultivated crops only during the period from about the first of May to the end of October (the winter months) and appeared unrelated to humidity. Its absence during the remainder of the year (the hot season) suggests that the high summer temperatures were the limiting factor. The only variety of cantaloup grown was Imperial #45, however approximately 15 to 20 percent of the plants were affected, suggesting that either the mildew present was strain #1 and the seed not uniform for resistance, or that there was a new strain of the fungus to which most of the plants were immune.

Watermelons were consistently and frequently seriously attacked by Mycosphaerella wilt. During the wet season, this crop was so badly damaged as to be impractical to grow, and during the drier part of the year whole fields were sometimes completely wiped out following a few days of rain. The disease always appeared shortly after emergence of the plants and spread from the center of the plants as they grew. A black blossom-end decay of the fruit of all stages of maturity was common and quite destructive. Moderate damage of cantaloup foliage was common but no fruit rot from Mycosphaerella was observed. Cucumber

foliage and fruit were not affected. This disease was unquestionably indigenous because of its occurrence on all plantings, even on those planted with seed surface sterilized with $HgCl_2$. The balsam vine (Momordica charantia) was very abundant everywhere and may have been a maintaining host.

Cantaloups and cucumbers were also subject to an apparently new virus disease causing a "witches'-broom" appearance to the diseased plants. This was observed only at Espiritu Santo. Whether it occurred elsewhere is unknown, for it was quite restricted as to season and opportunity for observations at other places was lacking. This is described in more detail on page 375 of this Reporter.

Sweetpotato and lettuce were each subject to an unidentified leaf spot of minor importance. Sweetpotatoes have been cultivated by the natives for centuries so this would perpetuate any disorders on it.

Peanuts grown at Guadacanal were infected with the Cercospora leaf spot [C. personata].

Heat canker was very troublesome during the hot summer season on Espiritu Santo, and undoubtedly generally distributed. Seedling onions and lettuce were particularly damaged, often whole fields would be destroyed by one or two hot sunny days. Seed beds of tomato, pepper, and eggplant were often damaged and occasionally seedlings of cantaloups and cucumbers were killed.

DIVISION OF TRUCK CROPS
UNIVERSITY OF CALIFORNIA
DAVIS, CALIFORNIA

LOSSES CAUSED BY POTATO DISEASES AT HASTINGS, FLORIDA

A. H. Eddins

Two fungous diseases, late blight (Phytophthora infestans) and Rhizoctonia (Rhizoctonia solani) [Pellicularia filamentosa] and 3 bacterial diseases, brown rot (Bacterium solanacearum) soft rot (Erwinia carotovora) and blackleg [E. phytophthora] were the 5 most important diseases of the potato at Hastings during the 15-year period, 1932-1946 (Table 1). The Hastings Section is the largest of 6 potato-growing areas in Florida. Common scab [Actinomyces scabies] is very destructive some years in central and south Florida, and it displaces Rhizoctonia as one of the 5 major diseases of potatoes for the State as a whole. Sclerotinia rot (Sclerotinia sclerotiorum) has recently become an important disease of potatoes in the southern part of the State.

Considerable progress has been made in controlling major diseases of the potato during the last few years. Rhizoctonia and brown rot have ceased to be very destructive in the Hastings area, because the Sebago and Katahdin varieties, which are grown on 95 percent of the acreage, are not as susceptible to these diseases as the Spaulding Rose which was the leading variety grown prior to 1939.

Bacterial ring rot [Corynebacterium sepedonicum] caused considerable trouble in 1937 and 1938 before infected seed stocks were found and eliminated. Only a trace of this disease has appeared in seed potatoes since 1941; none was seen in 1946.

Maximum losses caused by virus diseases, including mosaic, leaf roll and spindle tuber, amounted to 6 percent of the crop in 1938, but since then losses caused by the different viruses have seldom exceeded a trace.

Late blight and soft rot, the 2 most troublesome diseases, should never cause as much damage in the future as they have in the past. Within a few years, varieties resistant to blight will probably displace the susceptible ones now grown, and better control of the disease will be secured with Dithane and other new fungicides. Installation and use of dryers at packing plants throughout the State should also reduce losses from soft rot.

Table 1. Losses caused by potato diseases in the Hastings Section during a 15-year period (1932-1946).

Disease	Loss in percentage	
	15-year average	Maximum during 15 years
Late blight	4.7	15 (1933, 1937, 1944)
Rhizoctonia	2.2	5 (1934)
Brown rot	1.8	8 (1935)
Early blight	T	0.5(1932, 1934)
Common scab	0.4	1.0 (1945)
Sclerotinia rot	T	0.5 (1934)
Southern rot	0.2	1.0 (1938)
Blackleg	1.3	4.0 (1937)
Fusarium seedpiece rot	T	0.5 (1936)
Mosaic	0.6	4.0 (1938)
Leaf roll	0.4	2.0 (1938)
Spindle tuber	T	0.5 (1939)
Ring rot	0.7	5.0 (1937)
Soft rot	1.6	10.0 (1944)
Hair sprout	T	T
Corky Ring spot	T	T
Average	13.9	

FLORIDA AGRICULTURAL EXPERIMENT STATION,
POTATO DISEASE INVESTIGATIONS LABORATORY, HASTINGS

ENDOTHIA CANKER ON POST OAK

Russell B. Clapper, G. F. Gravatt, and Donald C. Stout

Endothia parasitica, the fungus that causes chestnut blight, was observed to be causing cankers on post oak (Quercus stellata) at Port Republic, Maryland in 1935. Infected oaks showed varying degrees of damage. Limbs and tops of a few oaks were killed, but the majority of the infected trees showed cankers on the main stems. Some cankers were open, exposing the wood; others appeared to be superficial, with the fungus growing in the outer live bark but not in the inner bark. The characteristic fans of Endothia mycelium, as found in blighted chestnut bark, were also present in the infected bark of post oaks. One mode of entrance of the fungus appeared to be through branch stubs resulting from natural pruning.

Cankered post oaks have also been found at Mt. Vernon, Virginia, in the parks of the District of Columbia, and at numerous places in Maryland, northern Virginia, and southern Pennsylvania. Infected post oaks were found at Roanoke, Virginia, Knoxville, Tennessee, New Haven, Connecticut, and Athens, Georgia. Large open cankers that exposed the wood to checking had developed on the trees at Mt. Vernon. In a single area in Connecticut more than 30 percent of the trees were found to be infected.

Cultures of the fungus from post oak were characteristic of Endothia parasitica. Both American and Asiatic chestnuts were successfully inoculated with the fungus from post oak. Post oaks inoculated 8 months ago with E. parasitica from American chestnut have not yet produced cankers.

The chestnut blight fungus has been reported previously as infecting other oak species and other genera, the damage to these usually being considered insignificant. The post oak, both small trees and large merchantable ones, has suffered severe damage from this fungus in some areas. Reports of its occurrence and collection of bark specimens for diagnosis and culturing will be appreciated.

DIVISION OF FOREST PATHOLOGY, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

SUMMARY OF RESULTS OF TOBACCO BLUE MOLD (DOWNY MILDEW) CONTROL DEMONSTRATIONS IN VIRGINIA, 1946

S. B. Fenne

Approximately 85 demonstrations in the use of Fermate for the control of tobacco blue mold [Peronospora tabacina] were set up at the beginning of the season. A total of over 50 reports were received from cooperators on the results of these demonstrations (Table 1).

Practically all of the demonstrators reported satisfaction with the treatment. Most of them stated that Fermate was more effective than any material they had ever used and that they intend to treat their plant beds with it again next year. Several stated that they had abundant plants for their own use and for their neighbors. They considered the treatment to be very practical and simple to use. About 90 percent of the demonstrators thought that Fermate stimulated plant growth in addition to controlling the disease. Some stated that the treated plants grew faster and that they were greener and stockier than untreated ones; also, that the Fermate treatment seemed to help the plants even after they were set in the field.

Even though there were frequent rains which greatly interfered with the spray applications, satisfactory results were reported. There was some mold in most of the treated beds; however, it caused little damage. Many unsprayed beds were a complete loss and in practically all other cases, transplanting was delayed about 2 weeks and only about 65 percent as many plants were obtained even then.

As a result of the 1946 blue mold control program, it is estimated that over 50 percent of the tobacco growers in the flue-cured area and approximately 25 percent of the growers in the dark and burley areas sprayed their plant beds with Fermate during the season. As a result, there were ample plants in all three belts to set out the tobacco acreage with a large surplus left over.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS, VIRGINIA POLYTECHNIC INSTITUTE AND THE U. S. DEPARTMENT OF AGRICULTURE COOPERATING. August 28, 1946

Table 1. Results of Tobacco Blue Mold Control Demonstrations in Virginia - 1946

County	Cooperator	No. of spray applications	No. plants pulled per 100 sq. yds. season: Sprayed	No. plants pulled per 100 sq. yds. season: Check	Was blue mold in bed before spraying	Did spray stimulate plants	Was this a practical treatment	Remarks
Amelia	W. T. Chumney	10	15000		No	Yes	Yes	Blue mold disappeared after 2 sprayings
	Jack Ford	8	15000	8000	No	Yes	Yes	
	W. T. Smith	11	60000		No	Yes	Yes	
Charlotte	S. C. Owen	8	15000	5000	Yes	Yes	Yes	Best control I have ever used.
	H. C. Robinette	7			Yes	Yes		
	Norman White	12	15000	Few	No	Yes	Yes	
	Pernell Baker	4	50000	5000	No	No	Yes	
	Joe Miller	10	30000	None	No	Yes	Yes	
Cumberland	H. L. Meador	6	8000	1500	No	No	Yes	I believe this is a very good treatment
	R. M. Skees	8	19000	3000	No	Yes	Yes	
	J. A. Hazlegrove	10	15625	1500	No	Yes	Yes	Treated plants remained greener and stouter.
Dinwiddie	J. R. Duncan	5			Perhaps		Yes	I planted first tobacco in county. Mold present in bed did little damage.
Fluvanna	T. R. Cosner	4	14000		No	No	Yes	
	C. J. Perkins	7	5000		No	No	Yes	Blue mold appeared after I stopped spraying.
Goochland	18 demonstrators							All demonstrators reported satisfactory results and intentions to repeat treatment next year.

Table 1 cont.

King William	F. H. Pollard	3	22500		No	Yes	Yes	Best treatment I have ever used.
Lee	W. A. Russell	6	20000		No			
	Hyatt Bailey	1	20000	2000	Yes	No	Yes	Blue mold was raging at time of treatment; afterward there was no action of the mold.
	J. C. Wygal	10			No			Am convinced it saved my bed from destruction.
	R. S. Braumer	6	15000		Yes	Yes	Yes	
	M. Faunon	8			No	No	Yes	Treatment seems to help plants after pulling.
Louisa	W. P. Watkins	10	15000		No	Yes	Yes	Fermate saved my plants.
	N. C. Bickley	5	20000	0	No	Yes	Yes	Will spray next year.
	Henry Rigsby	10			No	Think so	Yes	Well pleased with results.
	S. L. Plounts	8			No	Think so	Yes	Already bought material for next year.
Lunenburg	H. Janesch	13	16000	3600	No	Yes	Yes	Sure prevention of blue mold.
	L. H. Jeter	10	18000	11000	No	Yes	Yes	Plants were greener and grew faster.
	C. C. Wilmoth	9	22000	12000	No	Yes	Yes	Many of my neighbors saw the demonstrations and expect to use Fermate next year.
	J. H. Featherstum	9	20000	15000	No	Yes	Yes	We expect to use it more next year.
Prince Edward	Odell Cook	9			Yes		Yes	All untreated beds were heavily affected with mold.
	O. L. Vassar	9			Yes	Yes	Yes	
	J. D. Carter	7			Yes		Yes	Plants grew faster.
	B. G. Carter	9			No		Yes	
	_____	10			No		Yes	It was a pleasure to have plants to give away.

MISCELLANEOUS NOTES ON PLANT DISEASES IN ARKANSAS

V. H. Young

Cherry: Leaf spot (Coccomyces hiemalis) was severe this year. Much damp, rainy weather during the month before harvest was apparently very favorable and leaves developed severe spotting and yellowing during the picking season. By the time trees were picked they had lost most of their foliage. A schedule which will provide protection without fruit staining is needed. Leaf spot is the most serious drawback to the raising of sour cherries in Northwest Arkansas.

Cotton: Angular leaf spot (Xanthomonas malvacearum) is of minor importance this year. One gets the impression in recent years that seed treatment, which is in general use, cuts down the number of initial infections so that only with unusually favorable weather conditions do outbreaks gain much headway.

Fusarium wilt (Fusarium [oxysporum f.] vasinfectum) seems less severe than in many years. Areas that showed 50 percent infection of ordinary commercial varieties in the summer of 1944 show only a few percent of infected plants this year. This was also true in 1945. Severe Fusarium wilt was seen in localized very sandy areas in Lawrence County this year. In all cases root knot (Heterodera marioni) was also present in the Lawrence County areas. Low organic content, extremely sandy soil, and often deficiency seem to result in an environment very favorable for Fusarium wilt.

Seedling diseases (various fungi) were severe. Much replanting was necessary and the combination of heavy seedling blight and unfavorable planting weather has made the crop unusually late. A very high percentage of the crop was planted in June--at least 2 or 3 weeks later than the optimum date. Stands are, however, generally adequate.

Verticillium wilt (Verticillium albo-atrum). Specimens and reports from the county agents of North Mississippi County and Cross County in the northwestern part of the State indicate that Verticillium wilt is much more prevalent than was first thought to be the case. County agents indicate that hundreds of acres of cotton are defoliated and that much more than the usual loss may be expected. Specimens sent in are of larger than average plants from heavy delta soil where ordinary Fusarium wilt is practically unknown. Nights in particular have been much cooler than usual for part of August and September which may be a factor influencing this unusual late outbreak of Verticillium wilt.

2, 4-D Injury. In 1945, a portion of one field of cotton in Craighead County was severely damaged by drift of a weed eradicant spray of the 2,4-D type which was being used to destroy growth in a fence row.

This year several acres of cotton was severely injured by drift of a similar spray from a field of rice where it was being used to eradicate the leguminous weed commonly known as "coffee bean". It is apparent that enough of these substances can drift several hundred feet to cause cotton plants to be badly deformed and unfruitful. In no case were the plants killed or rendered chlorotic. The leaves and bracts became thickened and greatly elongated and the affected parts were unfruitful.

Cucumber: Downy mildew (Pseudoperonospora cubensis) is reported as destroying two late plantings of several acres of cucumbers near Little Rock, Arkansas. Since weather conditions have been unusually dry and unfavorable for this disease and since the disease has not been reported in a severe form before in the State, further inquiry was made. It now appears that the owners of these tracts have been using surface irrigation which no doubt accounts, at least in part, for this unusual outbreak of downy mildew.

Grape: Black rot (Guignardia bidwellii) was less serious than it was expected to be. With unusually high prices for grapes, growers put on more than the recommended schedule and did a better job of control than in many years. Although weather conditions appeared favorable in many respects for a severe outbreak it failed to materialize. Temperatures were possibly somewhat low. Other grape diseases have been of distinctly minor importance.

Peach: Bacterial spot (Bacterium [Xanthomonas] pruni) in many cases combined with arsenical burning caused severe foliage injury and defoliation in orchards scattered over the State but when the zinc lime spray was applied in a full schedule of applications, foliage remained in excellent condition.

Brown rot and blossom blight (Sclerotinia [Monilinia] fructicola). Although blossom blight was sufficiently plentiful in many orchards to reduce greatly the original set of peaches, it was not followed by as much fruit rot as had been predicted. Curculio injury was prevalent early in the season and it was felt that the combination of blossom blight and curculio injury might lead to heavy losses. Growers, expecting a large crop and high prices, appear to have been successful in their efforts to keep brown rot down.

Leaf curl (Taphrina deformans) was of minor importance. Spraying gave efficient control and a survey of peach orchards in all areas except the Crowley's Ridge section failed to reveal any commercial orchards seriously affected with leaf curl.

Spinach: Blight (cucumber mosaic virus, typical strain). Although often present no severe attacks such as were seen in 1944 when whole fields were destroyed, have been seen since that time. The

rapid switch over to the Old Dominion variety beginning in the fall of 1944 may account for the decrease in this disease in this disease since this variety has proven highly resistant to spinach blight.

Downy mildew (Peronospora spinaciae) commonly known as blue mold, does not appear to have caused severe losses the past year although it was generally present in overwintered spinach.

White rust (Albugo occidentalis) was first found on spinach plants transplanted from a field near Van Buren in the fall of 1945. In March, 1946, a much more extensive outbreak of the disease occurred near Alma. There is some indication from the location of the affected areas that the disease has been brought in from the Texas spinach growing areas where it is known to be widespread. A great deal of spinach from Texas is trucked to the Alma area where it is canned. Since the disease appeared in this area relatively near to the canneries there is some suggestion at least that here was a case of direct spread from spinach waste.

Strawberry: Leaf spot (Mycosphaerella fragariae) was especially severe in the important White County strawberry area. The crop was seriously reduced, foliage was badly spotted and fruit stem injury greatly reduced yields. An open winter followed by much cool, wet weather prior to and during the fruiting season was very favorable to Mycosphaerella. The crop was considerably below the anticipated yield. Spraying is practiced to a very limited extent but many growers are planning a full scale control program the coming season.

Red stele (Phytophthora fragariae) caused severe local damage. It is largely confined to poorly drained areas but conditions for the development of this disease were apparently ideal the past year and more was seen than in previous years.

Tomato and potato: Tomato leaf diseases have been less destructive this year than last year. Defoliation is important and is being accompanied by sun scald but not so much as last year.

Late blight (Phytophthora infestans). Although there were reports from most of the States around us of injury from late blight we seem to have escaped. There have been no reports of these troubles whatsoever and our observations covering much of the northern half of the State failed to indicate that this disease was present. Aside from a very few doubtful reports of minor injury in years past, there is no record of late blight in Arkansas. Late blight rot has been observed frequently in late years on seed potatoes being shipped into the State.

DEPARTMENT OF PLANT PATHOLOGY
UNIVERSITY OF ARKANSAS

CHECK LIST REVISION

Freeman Weiss

ALYSSUM (CRUCIFERAE)

ALYSSUM spp. Low herbs, some grown for ornament as A. ARGENTEUM Vitm., YELLOWTUFT (1) and A. SAXATILE L., GOLDENTUFT (2). (For sweet alyssum see Lobularia.)

Plasmodiophora brassicae Wor., club root. N.J. (2).
Rhizoctonia solani Kuehn, damping off. N.J. (1,2).

ARABIS (CRUCIFERAE)

ARABIS spp., ROCK-CRESS. Mostly low perennials of rocky or alpine habitats in the North and West, some of food value to wildlife and some (A. albida Stev., A. alpina L.) grown for ornament.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. On various spp. from N.Y. to Va., Tex., Colo., and Wash.
Botrytis cinerea Pers. ex Fr., gray-mold blight. Wash.
Cornularia sphaeroidia (Ell.) Sacc., on stems. Utah.
Mycosphaerella cruciferarum (Fr.) Lindau, on capsules. ? Mass.
Peronospora parasitica Pers. ex Fr., downy mildew. On various spp. in Ala., Colo., Ind., Mich., Tex., Wis., Alaska. The form on A. virginica in Ala. has also been identified as P. lepidii (McAlp.) G. W. Wils.; that on A. oxyphylla in Colo. as P. arabidis oxyphyllae Gäum.
Phlyctaena andersoni Ell., on stems. Mont.
Phoma sp., on stems and capsules. Tex.
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex.
Puccinia holboelli (Hornem.) Rostr. (0,III), rust. On numerous native spp., but not those commonly cult., in the Rocky Mountain and Pacific Coast States to Alaska.
P. monoica (Pk.) Arth. (0,I), rust. On numerous native spp., Wis. to Colo. and N.Mex., Calif., and Wash., II and III on Koleria and Trisetum.
Pyrenophora depressa Pk., on stems. Calif.
Rhizoctonia solani Kuehn, damping off. N.J.
Septoria arabidis Sacc., leaf spot. Tex. var. macrospora Solheim, Colo.

ARMORACIA (CRUCIFERAE).

ARMORACIA RUSTICANA Gaertn., Mey. & Scherb., HORSE-RADISH. Course perennial of Eurasia, widely grown as an esculent and escaped in many areas; commercial cultivation mainly in the Middle West and Pacific Northwest.

Agrobacterium tumefaciens (E.F.Sm. & Town.) Conn., crown gall, ? fasciation. N.J., N.Y.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister (white rust). Mass. to N.J., Okla. and Mont.; probably general.

Alternaria brassicae (Berk.) Sacc., gray(small) leaf spot. Conn. to Del., Ill. and Iowa. Also reported as A. herculea (Ell. & Mart.) J. A. Elliott.

A. oleracea Milbrath (often cited as A. circinans (Berk. & Curt.) Bolle), black leaf spot. Conn. to Del., Mo., and Tex.; Nebr. Utah. The more familiar name A. circinans, based on Macrosporium c., is of doubtful standing though widely used; A. oleracea appears to be the first allocation to this genus of of the fungus causing this disease.

Cercospora armoraciae Sacc., leaf spot. General.

Erwinia carotovora (L. R. Jones) Holland, soft rot. (of stored roots), bacterial root rot. Conn., N.J., N.Y., Okla.

Erysiphe polygoni DC., powdery mildew. Calif.

Heterodera marioni (Cornu) Goodey, root knot. Ill., Miss., Okla.

Pellicularia filamentosa (Pat.) Rogers (Rhizoctonia solani Kuehn), root rot (of stored roots), also collar rot in the field. Ill., Mich., Minn., N.J., N.Y., Tex., Wash. The basidial stage occasionally occurs on basal stems and leaves.

Penicillium hirsutum Dierckx, root pitting, blue mold rot (of stored roots). Ill., N.J.

Peronospora parasitica (Pers. ex Fr.), downy mildew. Ala., Ill., N.J., S.Dak., Wis. Also identified, at least in part, as P. cochleariae Gäum.

Phyllosticta decidua Ell. & Kell., secondary leaf spot. Tex., Wash., Wis.

P. orbicula Ell. & Ev., leaf spot. N.Y.

Phymatotrichum omnivorum (Shear) Dug., root rot. Tex.

Plasmodiophora brassicae Wor., club root. Ill.

Ramularia armoraciae Fckl., pale leaf spot. General.

Rhizoctonia solani Kuehn. See Pellicularia filamentosa.

Thielaviopsis basicola (Berk. & Br.) Ferr., root rot. Kans., N.J.

Verticillium albo-atrum Reinke & Berth., wilt. Mich., Wash.

Xanthomonas campestris (Pam.) Dowson var. armoraciae (McCul.) Starr & Burkh., bacterial leaf spot. Conn., Ill., Iowa, Md., Mo., S.Dak., Va.

X. phaseoli (E.F.Sm.) Dowson, associated with bacterial root rot, perhaps a causal factor in this and also leaf spot. Ill.

Armoracia cont.

Black root -- cause doubtful, in part bacterial (see Erwinia and Xanthomonas); in part virus (see Curly top and Mosaic)

Black streak of stems -- cause unknown but sometimes associated with and perhaps an effect of mosaic. Ill., Wash.

Brittle root. See Curly top.

Curly top -- virus (Chlorogenus eutetticola Holmes, Beta virus 1 K.M.Sm.), Calif., Oreg., Wash.; ? Utah; probably Ill. and Kans. as cause of brittle root.

Fasciation -- in part physiological, perhaps in part due to bacterial infection. N.J.

Hollow root -- probably physiological. Common in overgrown roots.

Mosaic -- unidentified virus(es). Reported from Conn., Ill., N.Y., Ore., Wash., probably general. Fern leaf, sometimes considered a symptom of mosaic infection has been reported from Ill., N.Y. and Wash.; also interpreted as a common genetic variation. One of the components of horse-radish mosaic in Ill., Oreg. and Wis. has been shown to be turnip mosaic virus (Marmor brassicae Holmes, Brassica virus 2 K.M.Sm.)

BARBAREA (CRUCIFERAE)

BARBAREA VULGARIS R. Br., WINTER CRESS, YELLOW ROCKET. Biennial herb naturalized from Europe, sometimes a weed but furnishes food for wildlife.

Albugo candida (Pers. ex Chev.) O, Kuntze, white blister. Calif., Tex.

Alternaria sp., leaf spot. Pa.

Cercospora barbareae (Sacc.) Chupp, leaf spot. Wis. C. cruciferarum Ell. & Ev., as reported on this host in Conn., N.J. and Pa. perhaps belongs here.

Cuscuta gronovii Willd., dodder. N.Y.

Peronospora parasitica Pers. ex Fr., downy mildew. Tex.

Ramularia barbareae Pk., leaf spot. Mass. to N.J. Ohio and Wis.; Tex.

Sclerotium rolfsii Sacc., stem rot. Tex.

Xanthomonas barbareae Burk., black rot. N.Y.

Curly top -- virus (Chlorogenus eutetticola Holmes, Beta virus 1 K.M.Sm.) Tex.

Yellow dwarf -- virus (Marmor vastans Holmes). N.Y.

BRASSICA (CRUCIFERAE)

Brassica alba (L.) Rabenh.: B. HIRTA.
Brassica arvensis (L.) Ktze.: B. KABER
BRASSICA CAMPESTRIS L., BIRD RAPE (1). European annual or biennial locally naturalized, especially in the Pacific Coast States, where it is an abundant weed but is of food value to wildlife. B. C. var. NAPOBRASSICA (L.) DC., (B. napobrassica (L.) Mill.), RUTABAGA (2). Biennial cultivated form, widely grown as a winter vegetable.

Actinomyces spp. (usually reported as A. scabies (Thaxt.) Güssow) scab. Conn., Mich., N.J. (2)
Agrobacterium tumefaciens (E.F.Sm. & Town.) Conn, crown gall. N.Y., Tex. (2)
Albugo candida (Pers. ex Chev.) O, Kuntze, white blister (white rust). Mass., Tex., Vt., Hawaii (2)
Alternaria brassicae (Berk.) Sacc. (A. herculea (Ell. & G. Martin) J.A.Elliott; sometimes written as (Berk.) Sacc. sensu Bolle), gray leaf spot. Oreg. (1); Mich., Minn., Pa. (2). Root rot, Minn. (2).
A. oleracea Milbrath (? A. circinans (Berk. & Curt.) Bolle), black leaf spot. Conn., Mass., Minn., N.J., Pa., Tex., Va. (2)
Botrytis cinerea Pers. ex Fr., gray-mold rot. Occasional in markets (2)
Cercospora sp. (? C. brassicicola P. Henn.), leaf spot. Miss., N.J., Va., P.R. (2). The name C. bloxami Berk. & Br. (= Alternaria brassicae) has been applied to this.
Cercosporella albomaculans (Ell. & Ev.) Sacc., white spot. Calif., La., Mass., Minn. (2). Considered by some authorities to be a synonym of C. brassicae (Fautr. & Roum.) Hoehn.; has also been held to be a true Cercospora i.e. C. albomaculans Ell. & Ev.
Colletotrichum higginsianum Sacc., anthracnose Ga. (2)
Erwinia carotovora (L.R.Jones) Holland, slimy soft rot. Ga., N.Car. (in fields); occasional in markets (2).
Erysiphe polygoni DC., powdery mildew. Northeastern States to Fla., Tex., and Calif.; also Wash., Hawaii (2).
Fusarium sp., dry rot of roots. Minn. (2)
Heterodera marioni (Cornu) Goodey, root knot. Ala., Ariz., Oreg., Tex. (2)
Mycosphaerella brassicicola (Fr. ex Duby) Lindau, ring spot. Calif. (2)
Peronospora parasitica Pers. ex Fr. (P. brassicae Gäum.), downy mildew. Conn., Fla., Iowa, N.J., Oreg., Tex. (2)
Phoma lingam (Tode ex Fr.) Desm., blackleg, root rot. Conn., Ga., Mass., Minn., Hawaii (2)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (2)
Plasmodiophora brassicae Wor., club root. Conn., Minn., N.J.,

Brassica cont.
N.Y., N.Dak., Wash. (2)
Pratylenchus pratensis (De Man) Filip., root nematode. Md. (2)
Pseudomonas maculicola (McCul.) F. L. Stevens, bacterial leaf spot. Mass., N.J.; ? Minn. (2)
Rhizoctonia solani Kuehn, root and stem rot. Fla., Wash., Hawaii (2)
Rhizopus sp. (R. stolonifer (Ehr. ex Fr.) Lind), soft rot. Cosmopolitan (2). R. fusiformis Dawson & Povah. Ill. (2)
Sclerotinia sclerotiorum (Lib.) DBy., watery soft rot. Calif. (1), Me., Wash. (2)
Verticillium albo-atrum Reinke & Berth., wilt. Calif. (2)
Xanthomonas campestris (Pam.) Dowson, black rot. Northeastern States to Fla. and Tex.; North Central States (2)

Mosaic -- virus (in part Marmor brassicae Holmes, Brassica virus 2 K.M.Sm.; perhaps also M. cruciferarum Holmes, Brassica virus 3 K.M.Sm.) Conn., Fla., Ind. Miss., N.Y., ? Ida. (2). Systematic infection of both hosts results from inoculation with either virus; apparently the latter virus is reported on (1) in Oreg.
Brown heart (internal black spot, water core) -- boron deficiency. Calif., Mass., Minn., Va., Wis. (2)

BRASSICA HIRTA Moench (B. alba (L.) Rabenh.) WHITE MUSTARD (1); B. JUNCEA (L.) Coss., including var. CRISPIFOLIA Bailey (B. japonica Hort.), LEAF M. (2); B. NIGRA (L.) Koch, BLACK M. Introduced annuals from Europe or Asia; (1) locally and (3) widely naturalized, the latter an abundant weed but also grown for seed, the source of commercial mustard; (2) is cult. for greens.

Albugo candida (Pers. ex Chev.) O, Kuntze, white blister. Ill., Ind., N.Car., S.Dak., Tex., Wis. (1); Calif., Fla., La., Miss., N.J., N.Y., N. and S.Car., Okla., Tex., Wis. (2); general (3)
Alternaria brassicae (Berk.) Sacc. Reported on (3) in Calif. and Iowa; perhaps mistaken for A. oleracea.
A. fasciculata (Cke. & Ell.) L.R.Jones and Grout (A. tenuis Nees ex Wiltshire), on leaves. Vt. (1)
A. oleracea Milbrath, black spot. Calif. (2,3)
Cercospora sp., (? C. brassicicola P. Henn.), leaf spot. Ind., La., N.J., P.R. (2); N.J. (3). Also reported as C. bloxami Berk. & Br., concerning which see note under Brassica campestris.
Cercosporella albomaculans (Ell. & Ev.) Sacc.; white spot. Calif. (2) Mass. (1,3)
Colletotrichum higginsianum Sacc., anthracnose. N.Car. (3)
Erwinia carotovora (L.R.Jones) Holland, slimy soft rot. Okla.,

Brassica cont.
P.R., probably general (2).
Erysiphe polygoni DC., powdery mildew. Calif., Tex. (1,2); Ariz., Fla. (2); Calif. Ind. (3).
Fusarium sp., wilt. N.Dak. (2 ?)
Heterodera marioni (Cornu) Goodey, root knot. Tex. (1,2); Fla., Mo. (2, 3).
H. schachtii A. Schm., root nematode. Utah (1,2,3).
Peronospora parasitica Pers. ex Fr., downy mildew. S.Dak., Tex. (1); Conn., Fla., Iowa, Tex. (2); Fla., Iowa, N.Y., S.Dak., Wis. (3).
Plasmodiophora brassicae Wor., club root. Calif. (1,2,3); N.J. (1); Conn., Ohio, Tex., Wash. (2).
Pleospora media Niessl, on stems. Calif. (3)
Puccinia aristidae Tracy (O,I), rust. Colo. (2,3)
Ramularia armoraciae Fckl., leaf spot. Mich. (3)
Rhizoctonia solani Kuehn, damping off, root rot. Cosmopolitan.
Sclerotinia sclerotiorum (Lib.) DBy., drop, crown rot. Tex. (1, 2)
Septoria brassicae Ell. & Ev., leaf spot. W.Va. (3)
Xanthomonas campestris (Pam.) Dowson, black rot. Fla., Ohio (2).

Mosaic -- virus(es). Ind., La., N.Y., Va., Tex., Wis. (2); Calif., Ida., Ind., La., N.Y. (3). All 3 host spp. are susceptible to systemic infection by both Marmor brassicae and M. cruciferarum Holmes (Brassica viruses 2 and 3 K.M.Sm.)
Yellows -- virus (Chlorogenus callistephi Holmes, Callistephus virus 1 K.M.Sm.). Tex. (2 ?)

BRASSICA KABER (DC.) L. C. Wheeler (B. arvensis (L.) Rabenh.) CHARLOCK. European annual, widely distributed weed, of food value to wildlife.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Vt. to Ind., Kans., and N.Dak.
Cercospora bloxami Berk. & Br., leaf spot. P.R.
Erysiphe polygoni DC., powdery mildew. Calif., N.J.
Peronospora parasitca Pers. ex Fr., downy mildew. Iowa.
Plasmodiophora brassicae Wor., club root. N.J.
Puccinia aristidae Tracy (O,I), rust. Colo.
Sclerotinia sclerotiorum (Lib.) DBy., stem rot. Mont.

BRASSICA NAPUS L., RAPE. European biennial, grown for forage.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Minn.
Cercospora sp. (? C. brassicicola P. Henn.), leaf spot. P.R. Reported as C. bloxami Berk. & Br.; see note above.
Heterodera marioni (Cornu) Goodey, root knot. Ala., Fla.

Brassica cont.

Peronospora parasitica Pers. ex Fr., downy mildew. Conn.

Plasmodiophora brassicae Wor., club root. Conn., N.J., N.Y.

Sclerotinia sclerotiorum (Lib.) DBy., crown rot, white blight. Calif., Ida., Miss.

Xanthomonas campestris (Pam.) Dowson, black rot. Ind., N.J., Pa.

Mosaic -- virus (unidentified). N.Y.

BRASSICA OLERACEA L. European biennial, source of various cultivated types as follows: var. BOTRYTIS L. (including var. italica Plenck), CAULIFLOWER, BROCCOLI (1); var. CAPITATA L., CABBAGE (2); var. GEMMIFERA DC., BRUSSELS SPROUTS (3); var. GONGYLODES L., KOHL-RABI (4); var. VIRIDIS L., KALE (5). Cult. throughout the U.S., commercially (1) chiefly in Calif., N.Y., Colo., Mich.; (2) in Tex., N.Y., Wis., Calif., and in Southeastern, Middle Atlantic, and North Central States; (3) in (4) in Va. to Fla. and Tex.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister (white rust). Calif. (1); Calif., Ida., Ky., Nebr., N.Car., Ohio, Tex. (2); Tex. (5)

Alternaria brassicae (Berk.) Sacc. (A. herculea (Ell. & G. Martin) J. A. Elliott), gray leaf spot. Calif., Conn., N.Y., Oreg., Tex. (1,2). Owing to nomenclatorial confusion many of the reports under this name have actually referred to the disease next listed. As the distribution indicated above pertains only to the fungus that is properly so designated under rules of nomenclature it is probably very incomplete.

A. oleracea Milbrath, black spot (leaves and pods); brown rot, head browning (of cauliflower). General (1,2,5); Calif., Ind., N.Y., Tex. (3). See note on relation of A. oleracea to A. circinans. (Berk. & Curt.) Bolle under Armoracia.

A. tenuis Nees ex Wiltshire, seed mold. Cosmopolitan (1,2).

Ascochyta sp. (? brassicae Fckl.), leaf spot. Guam (2).

Botrytis cinerea Pers. ex Fr., gray-mold blight. Calif. (1,3); Fla. (1); frequent in Pacific Coast States, especially on seed crops (2); also gray-mold rot in transit, markets, and storage -- cosmopolitan.

Cercospora sp. (? C. brassicicola P. Henn.) leaf spot. P.R. (1); Calif., Del., Fla., Ill., Miss., N.J., Okla., Tex., Guam, P.R. (2) Previously reported as C. bloxami Berk. & Br., concerning which see note under Brassica campestris. C. cruciferarum Ell. & Ev., as reported in Ala. on (2) and (5) may also belong here.

Cercosporella albomaculans (Ell. & Ev.) Sacc., white spot. Ind. (1); Ga., Oreg. (2). Perhaps a synonym of C. brassicae (Fautr. & Roum.) Hoehn., as reported in Oreg. (1,2) and Pa. (1).

Erwinia carotovora (L.R.Jones) Holland, slimy soft rot (in transit and markets), stumpt rot (in fields following black rot).

Brassica cont.

Cosmopolitan (1,2,3,5).

Erysiphe polygoni DC., powdery mildew. Calif. (1); Ariz., Calif., Conn., Fla., Md., Nebr., Oreg., Tex. (2); Calif., Conn., Md., Va., ? Wash. (5).

Fusarium oxysporum Schlecht. f. conglutinans (Wr.) Snyder & Hansen, yellows. Calif., Del., Ind. Mich., N.J., N.Y., Tex., Wis. (1); general in susceptible vars. (2); Calif., Wis. (3); Ind., Wis. (4); Ala., Calif., Ill., Ind., Md., Miss., N.Y., N.&S.Car., Tex., Va. (5).

Helminthosporium brassicolum (brassicicola) Schw., on leaves. ? Pa.

Heterodera marioni (Cornu) Goodey, root knot. Fla., N.J., Tex. (1); N.J. to Fla., Tex., and Calif., also Hawaii (2); Ohio, Tex. (4); Ala., N.Y., N.&S.Car., Tex. (5)

H. schachtii A. Schm., root nematode. Ida.

Heterosporium variabile Cke., leaf mold. Mont., N.Y. (2)

Leptosphaeria olericola (Berk. & Curt.) Sacc., on stems., ? Mass.

Mycosphaerella brassicicola (Fr. ex Duby) Lindau, ring spot. Calif., Oreg., Wash. (1,2); N.Y. (1); Ill., Tex. (2); Calif. (3); Ala., Calif., Wash. (5).

Olpidium brassicae (Wor.) Dang., in roots. Minn., Miss., N.Y., Wis. (2).

Peronospora parasitica Pers. ex Fr. (P. brassicae Gäum.), downy mildew. General on all types; typically a specialized race or races restricted to this species.

Phoma lingam (Tode ex Fr.) Desm., blackleg, leaf spot. General east of Rocky Mountains, also Oreg., Wash. (2); Northeastern and Gulf States (1,3,5).

Phyllosticta brassicicola McAlp., leaf spot. Calif. (2) Conidial stage of Mycosphaerella b. ?

Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (1,2,4,5).

Phytophthora megasperma Drechs., root rot. Calif. (1,2,3).

Plasmodiophora brassicae Wor., club root. General on all types.

Pratylenchus pratensis (DeMan) Filip., root nematode.

Pseudomonas maculicola (McCul.) F.L.Stevens, bacterial leaf spot, pepper spot. Widespread, mostly in the Northeastern and Middle Atlantic States, sometimes in the Gulf States; also Calif., Colo., Minn., Wash. (1,2); N.Y. (3); Va. (5).

Pythium sp., usually reported as P. debaryanum Hesse (? P. ultimum Trow), damping off. Occasional on all types.

P. ultimum Trow, head rot, ? stump rot. Occasional in markets (2).

Rhizoctonia solani Kuehn, damping off, bottom rot, wire-stem (on seedlings and young plants). General on all types; may also cause head rot of mature plants, especially (2). Vegetative stage of Pellicularia filamentosa (Pat.) Rogers (Corticium solani (Prill. & Del.) Bourd. & Galz.), occasionally found in this form on various Brassica spp.

Brassica cont.

Rhizopus stolonifer (Ehr. ex Fr.) Lind (R. nigricans Ehr.) black-mold soft rot. Occasional on market products, chiefly (2).

Sclerotinia sclerotiorum (Lib.) DBy., drop, cottony rot of field plants; watery soft rot of heads. General (1,2); Calif., La., Tex. (3); Ind. (4); Ga., N.&S.Car., Oreg., Va., Wash. (5). S. minor Jagger, reported in Pa. on (2) causes similar effects.

Sclerotium rolfsii Sacc., southern blight. N.Car. to Fla. and Tex., occasional on all types, chiefly (2) and (5).

Stemphylium botryosum Wallr., seed mold. ? Pacific Coast States (1,2). Conidial stage of Pleospora herbarum (Pers. ex Fr.) Rab. S. consortiale (Thuem.) Groves & Skolko also reported.

Xanthomonas campestris (Pam.) Dowson, black rot. General (1,2,5); Fla., N.Y., Tex., Va. (3); Fla., Minn. (4)

Black ring -- virus (? Marmor brassicae Holmes, Brassica virus 2 (probably = Brassica virus 1) K.M.Sm.) Calif. (1,2,3,5), Wash. (2). Fly speck, reported on (2) in Wash., and ring necrosis in Wis. are probably caused by related virus strains.

Curly top -- virus (Chlorogenus eutetticola Holmes, Beta virus 1 K.M.Sm.) Calif. (2).

Mosaic -- virus (in part Marmor brassicae, in part M. cruciferarum Holmes, Brassica virus 3 K.M.Sm., separately or together). Cauliflower mosaic as reported in Calif. and Ariz. is typically caused by M. cruciferarum alone; perhaps also in N.J., N.Y., Oreg., S.Car., and Va., or may be due to dual infection with M. brassicae. Cabbage mosaic as reported in Ill., Wis. and Wash., perhaps also in Calif. Oreg., Utah, N.Y., Pa., and the Southeastern States is typically caused by dual infection with both viruses, though either alone but especially M. cruciferarum may cause mottling. Brussels sprouts, kale, and kohlrabi are also susceptible to both viruses, singly or together; mosaic (? M. cruciferarum) of (3) is reported in Calif., Oreg. and N.Y.

Ring necrosis -- virus (Marmor brassicae Holmes, Brassica virus 2 (and 1) K.M.Sm.) Calif., Wash., Wis. (1,2). See also black ring.

Virus yellows -- virus (Chlorogenus callistephi var. californicus Holmes, Callistephus virus 1A K.M.Sm.). Calif. (1,2), ? Tex. (2).

Black leaf speck (internal black spot) -- physiological, attributed to low temperature and suboxidation in transit and storage. Calif., Ida., Ind., Mich., Minn., N.Y., Wash., Wis. (1,2). Internal necrosis of mature heads may be caused also by the cabbage black ring virus.

Brown heart (internal browning, ? hollow stem) -- physiological, probably boron deficiency. Fla., Mich., N.J., N.Y., Va. (1); Calif., N.Y., Tex., Va., Wis. (2). Internal necrosis of stems

Brassica cont.

and roots, probably due to the same cause is also reported on (2) in Wis.

Chlorosis -- mineral deficiency: Of magnesium, N.Y. (1), Ala., Fla., Miss., N.Y., N.Car., Va. (2); of manganese, Fla. (2).

Oedema (intumescence) -- in part physiological, due to excessive water tension, or to copper spray, or other chemical injury; in part mechanical, due to wind-blown sand; perhaps insect injury at times. Widespread (2), occasional (1,3, 5).

Pink head -- cause unknown presumed genetic. Calif. (1).

Tipburn -- physiological, probably potassium deficiency. Fla., N.J., N.Y., N.Car., Va., Wis. (1,2).

Whip-tail (spindly growth and failure to head) -- physiological, attributed to soil acidity and mineral deficiencies. N.J., N.Y. (1,2); W.Va. (1).

BRASSICA PEKINENSIS (Lour.) Rupr., PE-TSAI (1) and B. CHINENSIS L. PAK-CHOI (2). Annual to biennial herbs of China, (1) grown widely as a cool season vegetable, (2) chiefly as a garden novelty for greens; both indiscriminately called Chinese cabbage, but in market terms this refers to (1).

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Ala.

Alternaria brassicae (Berk.) Sacc., gray leaf spot. Calif., Conn., Fla., Ind., Md. (1)

A. oleracea Milbrath, black leaf spot. Calif., Conn., Fla., Mass., N.H., Tex. (1).

Cercospora sp. (? C. brassicicola P. Henn.), leaf spot. Fla., Ga., N.H., N.J., P.R. (1). Reports of C. armoraciae Sacc. and C. cruciferarum Ell. & Ev., as reported in N.H. and Fla., may belong here.

Cercosporella albomaculans (Ell. & Ev.) Sacc., white spot. Ala., Calif., Conn., Fla., Ind., Md., Mass., Mo., Pa., Va. (1); Calif. (2). Also reported as C. brassicae (Fautr. & Roum) Hoehn.

Colletotrichum higginsianum Sacc., anthracnose. Fla. (1).

(Cylindrosporium brassicae Fautr. & Roum): Cercosporella brassicae (? C. albomaculans)

Erwinia carotovora (L.R.Jones) Holland, slimy soft rot. Conn., Mass., Mo., Va., P.R., and com only in markets).

Erysiphe polygoni DC., powdery mildew. Ariz., Mass. (1).

Heterodera marioni (Cornu) Goodey, root knot. Ariz., Fla. (1).

Peronospora parasitica Pers. ex Fr., powdery mildew. (1).

Plasmodiophora brassicae Wor., club root. Conn., Mass., N.J., Ohio, Pa. (1).

Pseudomonas maculicola (McCul.) F.L.Stevens, bacterial leaf spot. Va.

Sclerotinia sclerotiorum (Lib.) DBy., watery soft rot. Ariz., Mass., N.Y., Tex. (1).

Brassica cont.

Sclerotium rolfsii Sacc., southern blight. Tex. (1).

Xanthomonas campestris (Pam.) Dowson, black rot. Ind., Md., Tex. (1).

Mosaic -- virus (probably strains of Marmor brassicae Holmes and M. cruciferarum Holmes, Brassica viruses 2 and 3 K.M.Sm., singly or together). Calif., Fla., Ind., N.Y., Oreg., Hawaii (1). A suspected virosis called fly speck is reported in Oreg.

Virus yellows -- probably Chlorogenus callistephi Holmes, Callistephus virus 1 K.M.Sm. N.Y. (1).

BRASSICA RAPA L., TURNIP. Biennial of Eurasia, widely grown as a root vegetable and for greens.

Actinomyces scabies (Thaxt.) Güssow, scab. Conn., Mich., N.J., Wash.

? Agrobacterium tumefaciens (E.F.Sm. & Town.) Conn., crowngall. Kans.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. General.

Alternaria brassicae (Berk.) Sacc., gray leaf spot, root rot. General in the North (N.Y. to Ind. and Iowa), Calif., Utah, Wash.; occasional in the South (Ala., Ark., Fla., Ga., Tex.).

A. oleracea Milbrath, black leaf spot. Conn., Fla., Md., Mass., N.J., N.Car., Tex., Hawaii.

A. tenuis Nees ex Wiltshire, seed mold. Cosmopolitan.

Cercospora sp. (? C. brassicicola P. Henn.), leaf spot. Ala., Fla., Ga., Miss. Formerly reported as C. bloxami Berk. & Br. C. cruciferarum Ell. & Ev., as reported in Kans., may belong here.

Cercosporella albomaculans (Ell. & Ev.) Sacc., white spot. Mass. to Fla., Tex., and Ind.; Oreg. Perhaps a synonym of Cercosprella brassicae (Fautr. & Roum.) Hoehn., reported in Conn., Ga., Mass., Miss., S.Car., Tex.

Colletotrichum higginsianum Sacc., anthracnose. N.Y. to Fla. and Tex.; P.R.

Erwinia carotovora (L.R.Jones) Holland, slimy soft rot (in field, transit, and storage). General.

Erysiphe polygoni DC., powdery mildew. Northeastern States to Fla., Tex. and Iowa; also Pacific Coast States and Ariz., Nev., Utah.

Fusarium oxysporum Schlecht. f. conglutinans (Wr.) Snyder & Hansen, yellows. Ind., Miss.

Heterodera marioni (Cornu) Goodey, root knot. N.Car. to Fla., Tex. and Okla.

Mycosphaerella brassicicola (Fr. ex Duby) Lindau, ring spot. Creg.

Peronospora parasitica Pers. ex Fr. (P. brassicae Gäum.), downy mildew. Mass. to Fla., Tex. and Ill.

Phoma lingam (Tode ex Fr.) Desm. (P. napobrassicae Rostr.), black

Brassica cont.
leg. Conn., Mass.
Phyllosticta sp. (? Phoma lingam), leaf spot. Tex., W.Va.
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex.
Plasmodiophora brassicae Wor., club root. Me. to N.Car., Tex. and Minn.; Calif., Colo., Wash.
Pseudomonas maculicola (McCul.) F.L. Stevens, bacterial spot. Conn., Mass.; Ga., N.Car., Va.
Pythium sp., root rot. N.Y.
P. ultimum Trow, damping off. Wis.
Ramularia sp. (? R. armoraciae Fckl.), leaf spot. Fla., Wash.; ? Ala.
Rhizoctonia solani Kuehn, damping off, root and stem rot, storage rot. Reported in Northeastern States, Fla., Tex., Va., Wash.; also Hawaii and P.R.; probably general. R. microsclerotia Matz, causing web blight, is reported in La. Both are vegetative stages of Pellicularia filamentosa.
Sclerotinia sclerotiorum (Lib.) DBy., drop, watery soft rot. Conn., Md., Miss., Tex., Wash.
Sclerotium rolfsii Sacc., southern blight. Fla., Tex.
Septomyxa affine (Sherb.) Wr., leaf spot. Ala.
Stemphylium botryosum Wallr., seed mold. Occasional on seed samples, probably from Pacific Coast.
Xanthomonas campestris (Pam.) Dowson, black rot. Me. to Fla., Tex., and Minn.
X. vesicatoria (Doidge) Dowson var. raphani (H.E.White) Starr & Burk., bacterial spot. Ind.

Curly top -- virus (Chlorogenus eutetticola Holmes, Beta virus 1 K.M.Sm.). Calif.
Mosaic -- virus (probably Marmor brassicae Holmes, Brassica virus 2 K.M.Sm.). Ala., Calif., Conn., Fla., Ind., Kans., La., Md , Miss., N.J., N.Y., S.Car., Tex., Wis. Natural mosaic infections commonly involve strains of this virus alone; the cauliflower mosaic virus (M. cruciferarum Holmes) can infect turnips systemically but has not been identified in this host in nature. A leaf-distorting, suspected virosis reported in Ida. is perhaps related.
Brown heart (dark center) -- physiological, probably boron deficiency. Conn., Me., Mass.

CAMELINA (CRUCIFERAE)

CAMELINA MICROCARPA Andrz. (1) and C. SATIVA (L.) Crantz (2), FALSEFLAX. Annual herbs naturalized from Europe, a weed in flax fields; seed yields oil and furnishes food for wildlife.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Ohio,

Camelina cont.
Okla., Utah, Va. (1,2); Pa. (1); Mont., Nebr., Tex. (2).
Plasmodiophora brassicae Wor., club root. N.J. (1,2).
Puccinia aristidae Tracy (O,I), rust. Colo., Utah (1).

CAPSELLA (CRUCIFERAE)

CAPSELLA BURSA-PASTORIS (L.) Medik., SHEPHERD'S-PURSE. Annual herb naturalized from Europe, a cosmopolitan weed but of food value to wildlife.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. General.
Cylindrosporium capsellae Ell. & Ev., leaf spot. Ind., Mo., Tex., Wis.
Heterodera marioni (Cornu) Goodey, root knot. Ala.
Peronospora lepidii (McAlp.) G.W.Wils., downy mildew. Ky., Wash.
P. parasitica Pers. ex Fr., downy mildew. General--reported from N.H. to Ill., Tex., and Wash.
Plasmodiophora brassicae Wor., club root. Calif., N.J., N.Y., Wash.
Puccinia aristidae Tracy (O,I), rust. Colo., Del., Nebr., Nev., Utah.
Ramularia armoraciae Fckl., leaf spot. Alaska.
Rhizoctonia solani Kuehn, root rot. Wash.

Mosaic -- virus (? Marmor brassicae Holmes or M. cruciferarum Holmes). Ida., Wis. Both viruses cause a systemic mottle in this host.

CARDAMINE (CRUCIFERAE)

CARDAMINE spp., BITTER CRESS. Low herbs, mostly boreal or alpine in moist, cool habitats; seldom cult. but adapted to bog gardens, also furnish food for wildlife.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. C. bulbosa (Schreb.) B.S.P. in Ind.; C. douglassii (Torr.) Brit. in Wis.; C. parviflora L. in Ga.; C. pennsylvanica Muhl. in N.Car.
Heterodera marioni (Cornu) Goodey, root knot. C. hirsuta in Fla.
Peronospora parasitica Pers. ex Fr., downy mildew. C. bulbosa in Del., N.Y., Wis.; C. douglassii in Wis.; C. hirsuta L. in Ill., Md., W.Va.; C. parviflora in Va. and Wis.; C. pennsylvanica in N.Car. and Wis.
Phoma lingam (Tode ex Fr.) Des., on stems of C. bellidifolia L. in Alaska.
Puccinia cruciferarum Rudolphi (III), rust. C. bellidifolia in

Cardamine cont.

Calif. and Alaska; C. cordifolia A. Gray in Utah and Wyo.
Septoria dentariae Pk., leaf spot. C. bulbosa in Del., N.Y., Wis.; C. douglassii in Wis.

CHEIRANTHUS (CRUCIFERAE)

CHEIRANTHUS CHEIRI L., WALLFLOWER. Spring-blooming periennial of Europe, grown for ornament chiefly in the North.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Minn.
Ascochyta cheiranthi Bres., on leaves. Alaska.
Botrytis cinerea Pers. ex Fr., gray-mold blight. Wash., Alaska.
Heterosporium sp., leaf spot. Okla.
Mycosphaerella cruciferarum (Fr.) Lindau, on pods. Pa.
Rhizoctonia solani Kuehn, crown rot. N.J.

Mosaic -- Natural infection not reported but reacts with systemic mottle to inoculation with turnip mosaic virus, Marmor brassicae Holmes.

COCHLEARIA (CRUCIFERAE)

COCHLEARIA OFFICINALIS L., SCURVY WEED. Low perennial of northern Europe, sometimes grown in the far north for greens or medicinal use.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Nebr., N.H.

CORONOPUS (CRUCIFERAE)

CORONOPUS DIDYMUS (L.) J.E.Smith (1) and C. PROCUMBENS Gilib. (2), WART CRESS. Low weedy herbs, introduced from Europe, of some food value to wildlife.

Heterodera marioni (Cornu) Goodey, root knot. ? Fla. (2).
Peronospora lepidii (McAlp.) G.W.Wils., downy mildew. N.Car. (1).

CRAMBE (CRUCIFERAE)

CRAMBE MARITIMA L., SEA-KALE. Coarse perennial of Europe, grown for edible shoots.

Alternaria oleracea Milbrath, black leaf spot. Va.

Crambe cont.
Fusarium oxysporum Schlecht. f. conglutinans (Wr.) Snyder & Hansen, yellows. Ind.

DENTARIA (CRUCIFERAE)

DENTARIA spp., TOOTHWORT. Native perennial herbs of woodlands, sometimes grown in wild-gardens.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Reported on various spp. from Me. to S.Car., Ind. and Wis.; also Calif.
Peronospora parasitica Pers. ex Fr., downy mildew. Commonly on D. laciniata Muhl. and D. diphylla Michx., occasionally on other spp., in the Northeastern and Central States. Also reported as P. cardamines-laciniatae Gäum.
Phyllosticta sp., leaf spot. On D. tenella Pursh, in Oreg.
Puccinia dentariae (Alb. & Schw.) Fckl. (III), rust. Oreg.
Septoria dentariae Pk., leaf spot. On D. diphylla in Mich. and N.Y.; D. laciniata in Ill., Ind., Wis.

DESCURAINIA (CRUCIFERAE)

DESCURAINIA spp. (Sophia, Sisymbrium in part), TANSY-MUSTARD. D. INCISA (Engelm.) Brit. (1) and D. PINNATA (Walt.) Brit. (2) are widely distributed native annuals, most frequent on open ground in the Western States; they furnish food for wild-life and are sometimes used from greens. Other spp. (3).

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Colo., Kans., Mont., N.Mex., Wash., Wyo. (1); Ariz., Ind., Iowa, Kans., Mont., Nev., Okla. (2); Mont. (3).
Ascochyta sisymbrii Ell. & Kell., leaf spot. Kans. (2).
Cercospora nasturtii Pass., leaf spot. Tex. (2).
Heterodera marioni (Cornu) Goodey, root knot. Fla., Nev. (2).
Peronospora lepidii (McAlp.) G.W.Wils., downy mildew. N.Mex. (1).
P. parasitica Pers. ex Fr. Colo., Kans., Minn., Mont., Nebr., N.Mex., Okla. (1); Ala., Iowa, Kans., Nebr., N.Mex., S.Dak., Tex., Wis. (2); Nev. (3). Also reported as P. sophiae-pinnatae Gäum.
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (2).
Puccinia aristidae Tracy (0,I), rust. Colo., Nebr., N.Mex., Utah (1); Ariz., Colo., N.Mex. (2)
P. holboellii (Hornem.) Rostr. (0,III), rust. Tex. (2).
P. monoica (Pk.) Arth. (0,I), rust. Colo., N.Mex., Utah (1); Colo., N.Mex. (2); Utah (3).
Septoria sisymbrii Ell., leaf spot. Okla. (1). S. sisymbrii Niessl

Descurainia cont.
has priority, may be distinct.
Urocystis coralloides Rostr., root gall. Ariz. (2).

DRABA (CRUCIFERAE)

DRABA spp., WHITLOW-GRASS. Small herbs, native and European, of diverse habit, used chiefly in rock-gardening; some useful to wildlife.

Albugo candida (Pers. ex Chev.) C. Kuntze, white blister. On D. caroliniana Walt. in Kans.; D. nemorosa L. in Wyo.
Mycosphaerella pachyasca (Rostr.) Vest., on stems. Alaska.
Peronospora parasitica Pers. ex Fr. (P. drabae Gäum.) downy mildew. On D. caroliniana in Ill., Iowa, Kans., Nebr., Wis.; D. nemorosa in Colo., S.Dak., Wyo.; D. cuneifolia Nutt. and D. platycarpa in Tex.
Phlyctaena andersoni Ell., on stems. Mont.
Pleospora media Niessl, on stems. Alaska.
Puccinia aristidae Tracy (0,I), rust. On various spp. in Ariz.
P. drabae Rudolphi (III), rust. On various spp. in Alaska, Utah, and Wyo.
P. holboelli (Horneum) Rostr. (0,III), rust. Calif., Colo., Utah.
P. monoica (Pk.) Arth. (0,I), rust. Calif., N.Mex.

ERYSIMUM (CRUCIFERAE)

ERYSIMUM ASPERUM DC., WESTERN WALLFLOWER (1). Showy-flowered perennial of open ground ranging from the Northeastern and Central States south and west; includes the cult. form known as Cheiranthus allionii Hort. Several other spp. (2) native or introduced from Europe occur on waste ground; some have ornamental value.

Albugo candida (Pers. ex Chev.) O. Kuntze, white blister. Oreg., Tex. (1) Ida. (2).
Cercospora erysimi J.J.Davis, leaf spot. Wis. (2).
Erysiphe polygoni DC., powdery mildew. Calif. (2).
Peronospora parasitica Pers. ex Fr., downy mildew. Ida. (1); Colo., Iowa, Wyo. (2).
Plasmopara brassicae Wor., club root. N.J. (1,2).
Pleospora vulgaris Niessl, on stems. Calif.
Puccinia aristidae Tracy (0,I), rust. Colo., N.Dak. (1); Ariz., Nebr., Utah (2).
Rhizoctonia solani Kuehn, root rot. Tex. (1).

Mosaic -- Natural infection not reported but some strains of tur-

Erysimum cont.
nip mosaic virus (Marmor brassicae Holmes) induce systemic mottling. Susceptibility to aster yellows virus, Chlorogenus callistephi Holmes, also shown.

DIVISION OF MYCOLOGY AND DISEASE SURVEY

CORRECTIONS

The dates July 10 and 11 cited for the survey of late blight of potato and tomato on the Eastern Shore of Maryland in the report of C. E. Cox et al., in Supplement 164, page 284, is an obvious typographical error. The correct dates are June 10 and 11.

O. C. Boyd makes the following correction in his article on "Cucumber Downy Mildew in Massachusetts, PDR 30(9), September 15, 1946.

Page 347, second paragraph: "On July 8" should read "On August 8".

AUGUST WEATHER

(From U.S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for week ending September 10, 1946.)

Map I shows that August 1946 was cooler than usual over the northern Interior and eastern portion of the country and generally above normal elsewhere. Temperatures averaged 4° below normal in the Ohio Valley, while they ranged from 2° to 4° above normal in the Southwest and far western Interior.

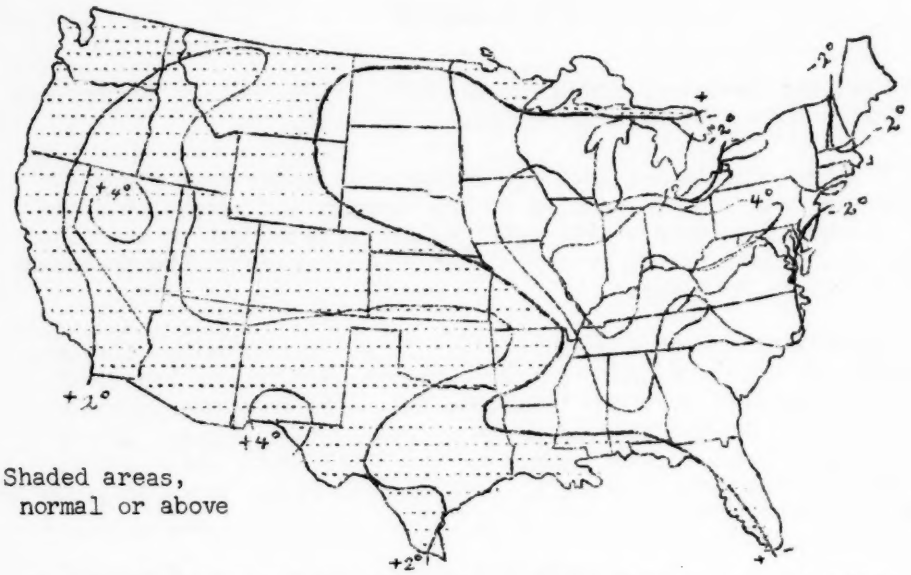
The spotted nature of August rainfall is evident from Map II. Less than half the usual rainfall was received in sections of the lower Mississippi Valley, northern Interior, far northwestern border districts, most of Tennessee, and parts of southwestern Texas. Amounts were more than twice their normals on the New England coast and in sections of northeastern Florida, northeastern Texas, Missouri, southwestern Illinois, Colorado, and Arizona.

SUMMER WEATHER

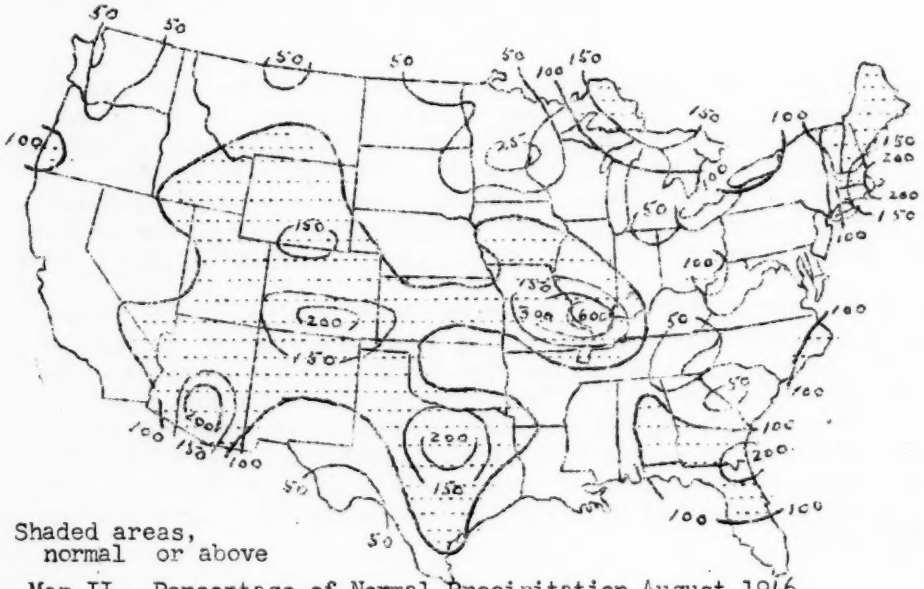
(From U.S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for week ending September 10, 1946.)

Map III shows that the summer of 1946 averaged cooler than usual in the lower Lake region, Ohio Valley, and most sections of the Atlantic and Gulf States, with departures averaging 2° below normal in sections of Pennsylvania, Virginia, eastern North Carolina, north-central Alabama, and some adjacent areas. Elsewhere temperatures averaged above normal; the plus anomalies exceeded 2° quite generally in the western Plains, Rocky Mountains, the Southwest, and far western interior areas.

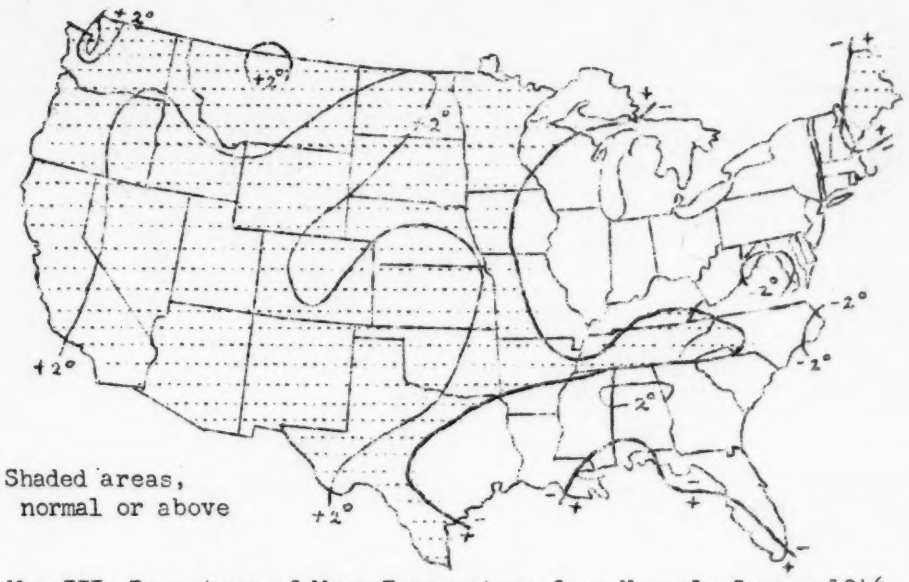
Map IV shows that the summer was drier than usual in the northcentral Interior, far northwestern border districts, in most of the Pacific States, and quite generally from southeastern New Mexico eastward over the southern Plains, Tennessee, and the southern Appalachian region. More than the usual precipitation was received from southern New York and southern New England southward over Atlantic coastal areas, in the east Gulf coastal Plain, in the immediate middle Mississippi and lower Ohio Valleys, and in Wyoming, Arizona, and adjacent areas.



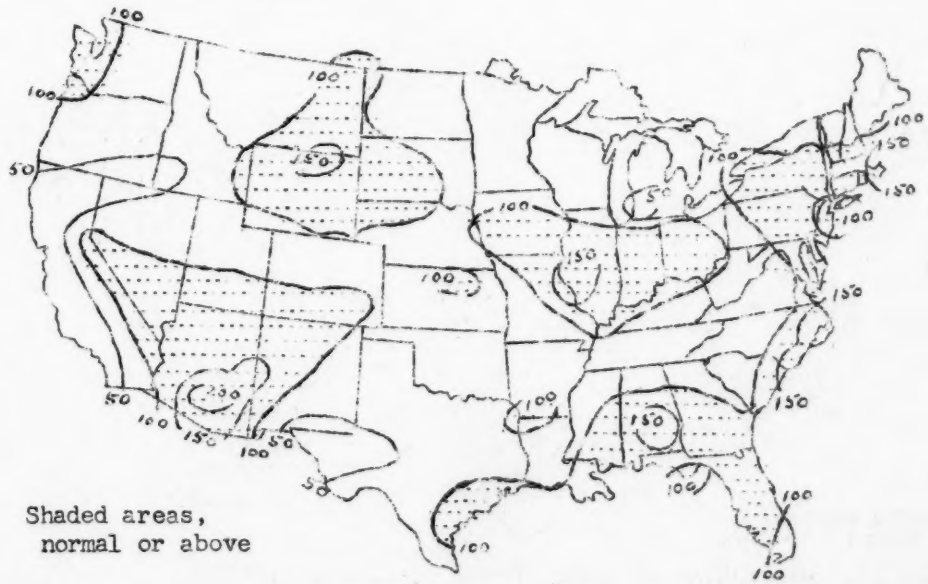
Map I. Departure of Mean Temperature from Normal, August 1946



Map II. Percentage of Normal Precipitation August 1946



Map III. Departure of Mean Temperature from Normal, Summer 1946 (June - August)



Map IV. Percentage of Normal Precipitation, Summer 1946 (June - August)